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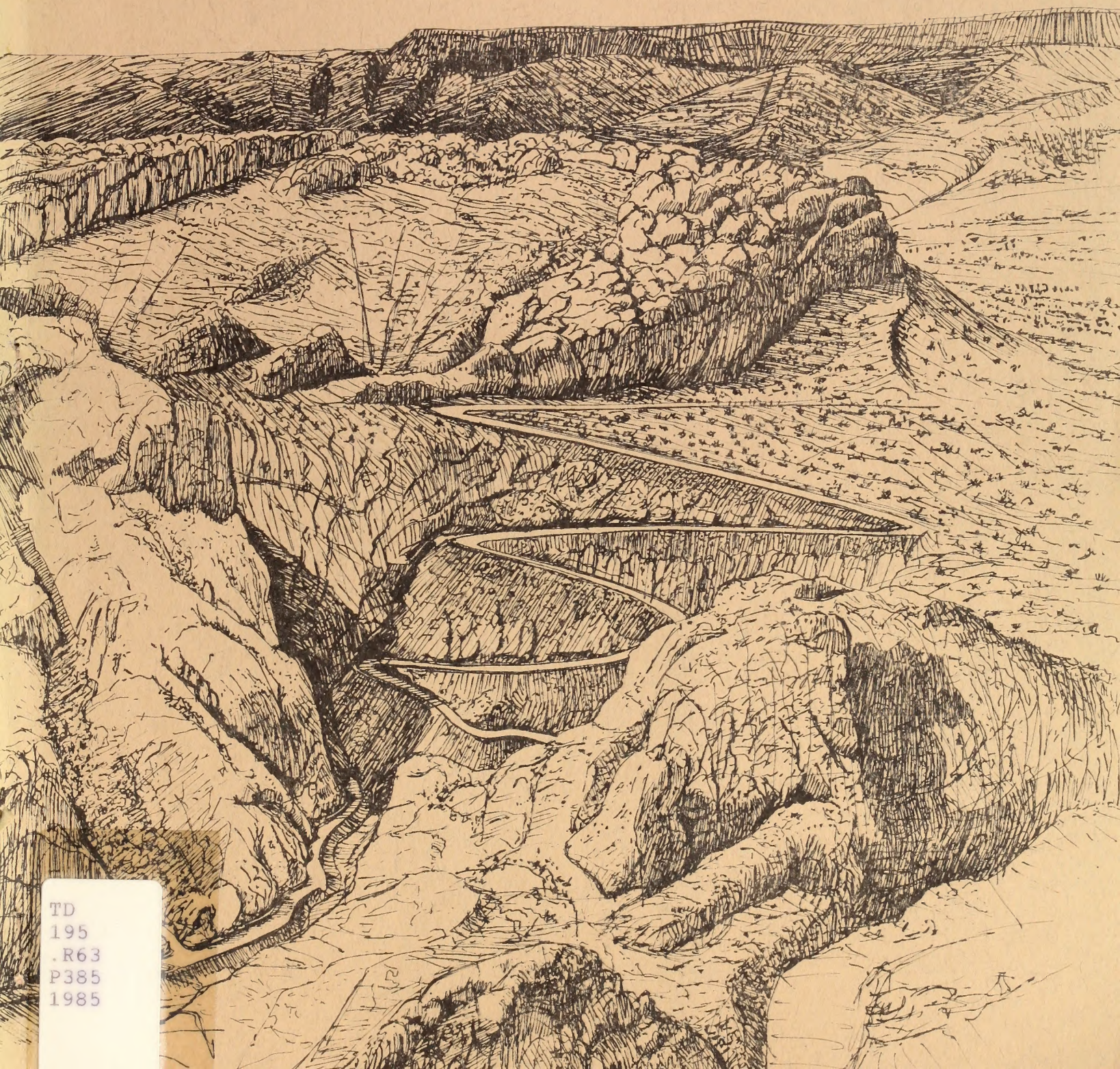

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UNITED STATES DEPARTMENT OF THE INTERIOR

NATIONAL PARK SERVICE AND BUREAU OF LAND MANAGEMENT

DRAFT

ENVIRONMENTAL ASSESSMENT

ON

PAVING THE BOULDER-TO-BULLFROG ROAD

Garfield County, Utah

May 1985

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UNITED STATES DEPARTMENT OF THE INTERIOR

NATIONAL PARK SERVICE AND BUREAU OF LAND MANAGEMENT

ENVIRONMENTAL ASSESSMENT

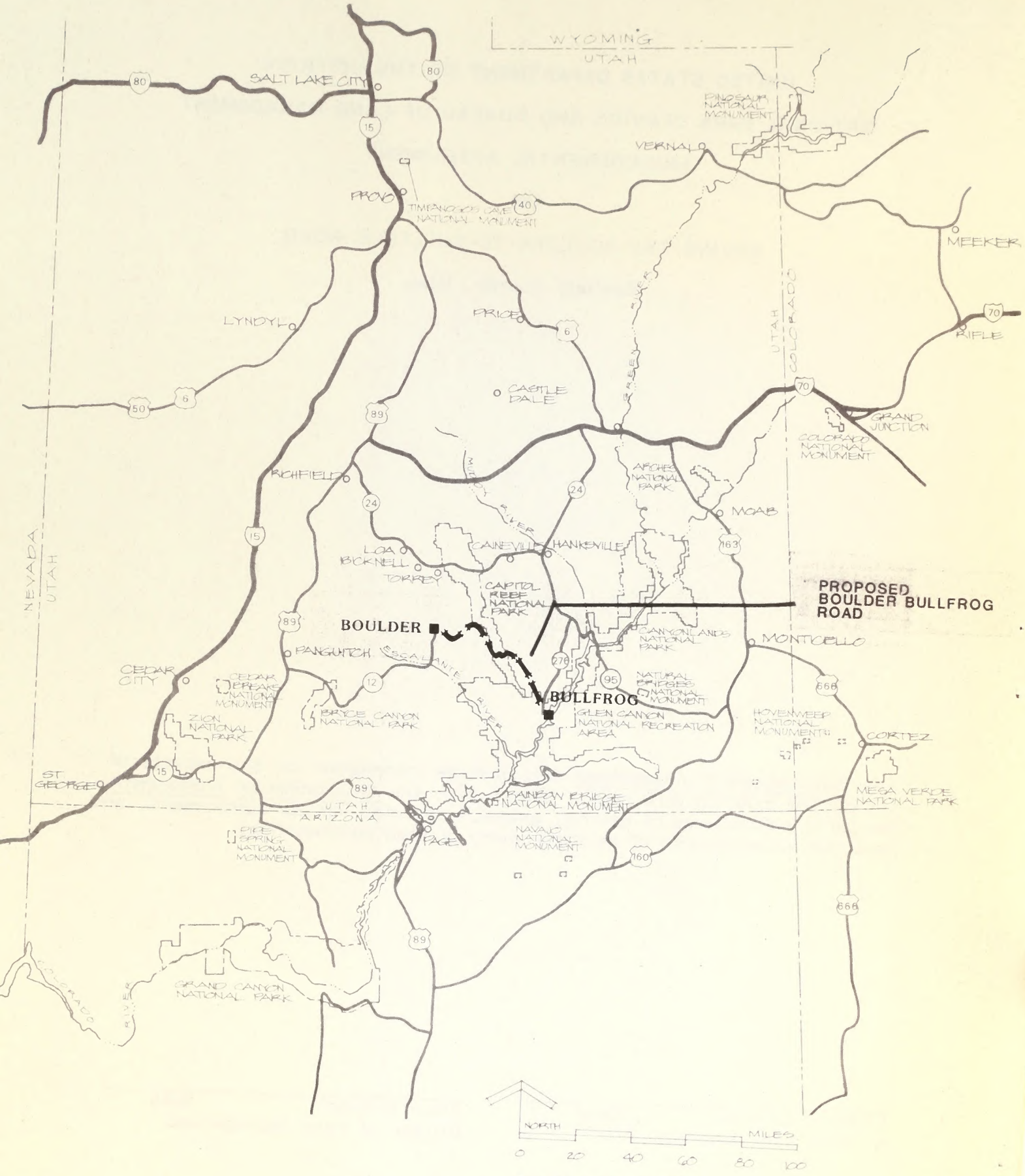
ON

PAVING THE BOULDER-TO-BULLFROG ROAD

Garfield County, Utah

The Environmental Assessment will provide information on the impacts of paving the existing dirt road. Specifically, the Environmental Assessment considers alternatives of paving, gravel surfacing, limited improvement, and no action (continuation of existing levels of road maintenance).

Regional Director Date	State Director Date
National Park Service	Bureau of Land Management



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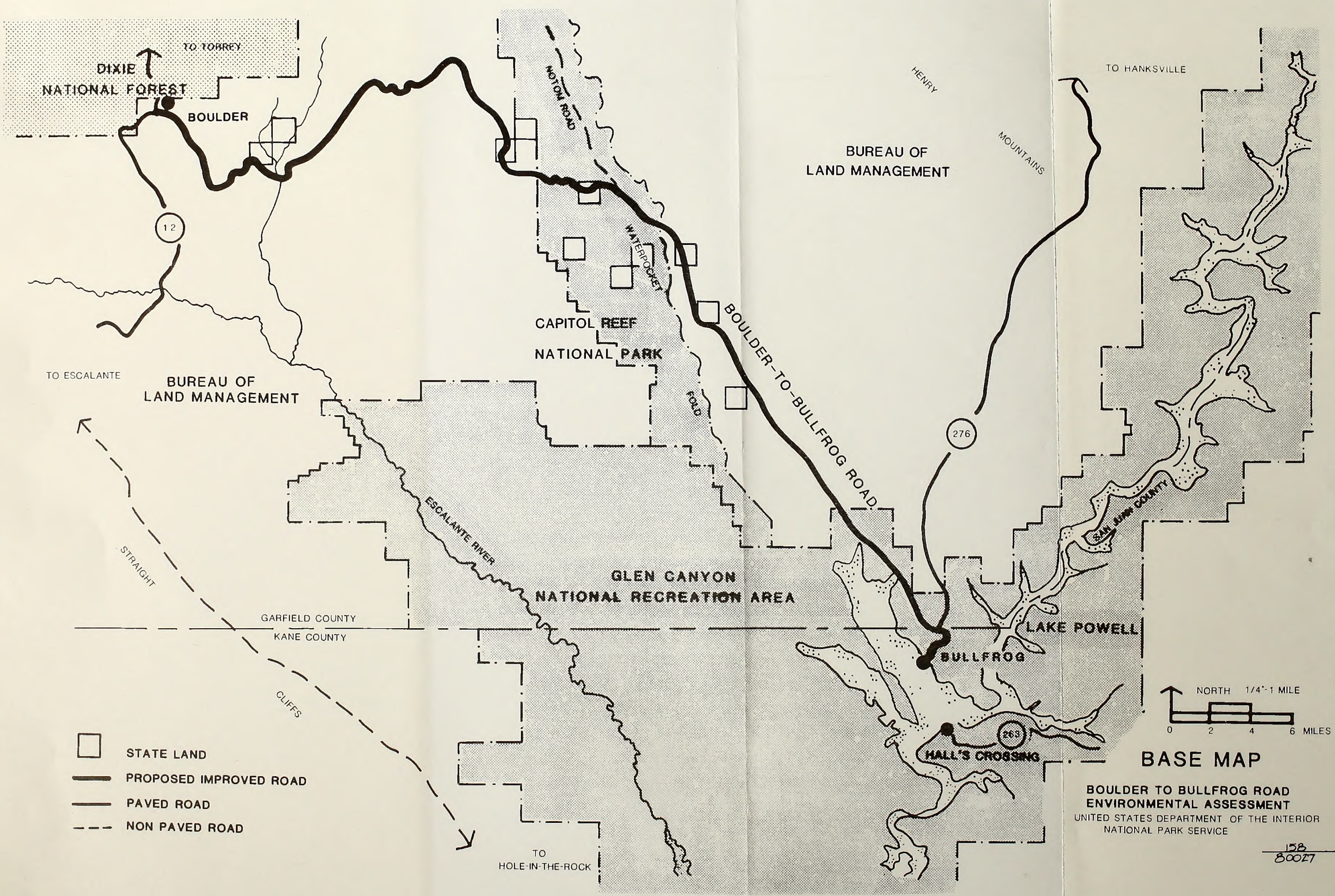

BASE MAP

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ENVIRONMENTAL ASSESSMENT

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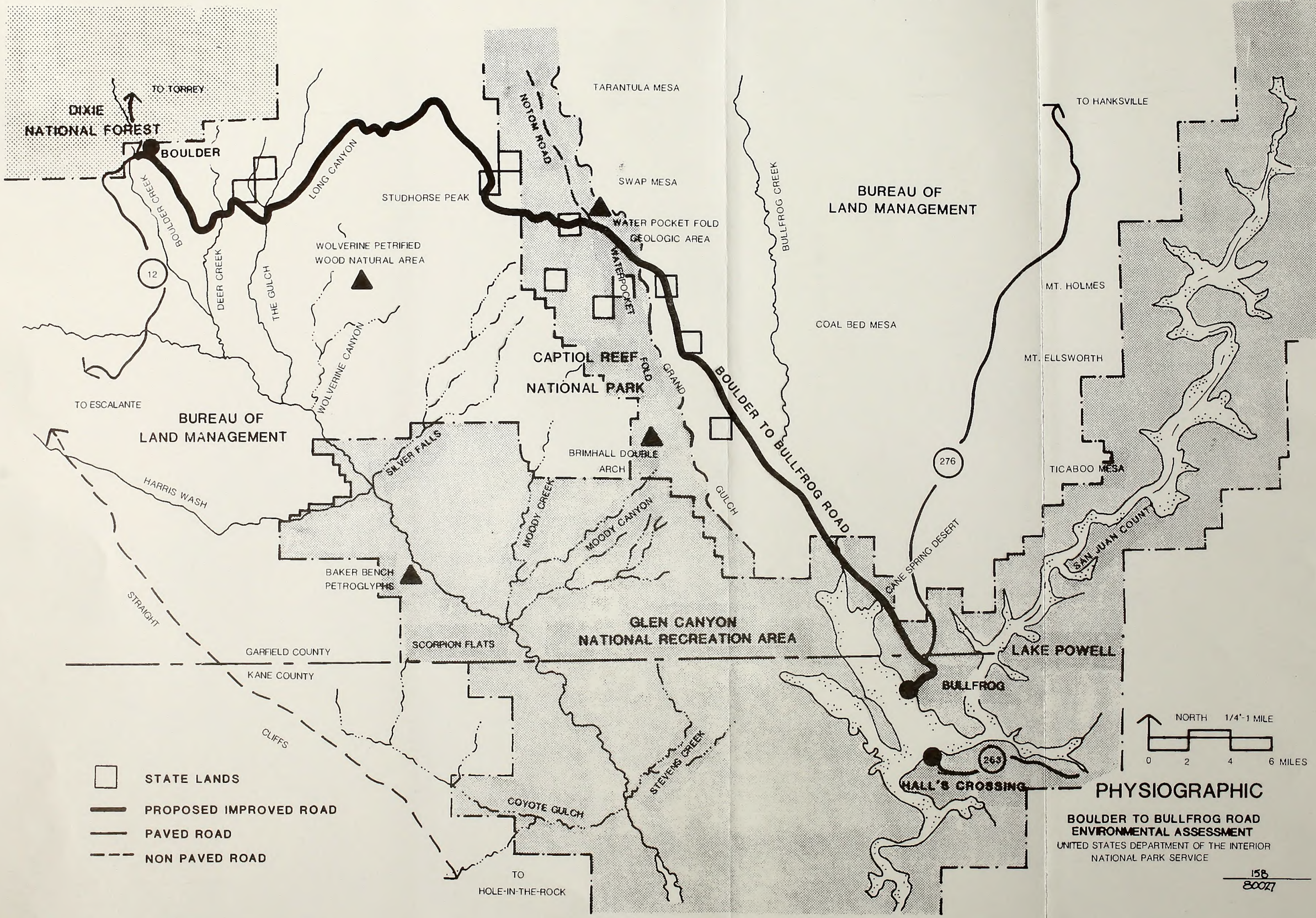

PHYSIOGRAPHIC

BOULDER TO BULLFROG ROAD ENVIRONMENTAL ASSESSMENT

UNITED STATES DEPARTMENT OF THE INTERIOR
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PURPOSE AND NEED FOR ACTION

INTRODUCTION

The Boulder-to-Bullfrog road extends about 66 miles through Garfield County, Utah. Except for about 2½ miles of asphalt pavement just east of the town of Boulder, the road is entirely of gravel and dirt.

Historically, the road has been the primary crossing route over the southerly portion of the Waterpocket Fold, a major physiographic feature of Capitol Reef National Park. Various changes over the years have altered the entire route somewhat, and the present configuration dates from widening that was done in 1967 by the Atomic Energy Commission for uranium hauling and since by Garfield County.

In the seventies and early eighties there were several proposals to upgrade this road. In May 1984 the "Boulder-Bullfrog Scenic Road" Preliminary Engineering report was prepared by Creamer and Noble Engineers and the Five County Association of Governments, proposing to construct an all-weather road on the existing roadway location. This assessment is developed to array for public review the proposal to pave, and to provide additional alternatives for all-weather roads over the existing route.

There is a perceived need on the part of local governmental officials to accommodate increased tourism activity in the region. The construction of an all-weather road between the town of Boulder and the Bullfrog Basin in Glen Canyon National Recreation Area is viewed as an integral step in the completion of the "Grand Circle" tour, a route encompassing most of the frequently-visited park and recreation areas in southern Utah.

Other needs for paving the road have been identified. Certain travel distances for county officials and residents are significantly increased when bad weather and heavy snow closes the Boulder-to-Bullfrog road. Access to medical and educational facilities could be improved. And, occasional law enforcement and rescue situations in isolated areas would be more easily resolved.

Visitor use of the road through Capitol Reef National Park has been documented since 1978. There are also counts for areas near the southern terminus of the Boulder-to-Bullfrog road.

Number of Vehicles Counted Daily

Year	Burr Trail*	Bullfrog Landing**	Halls Crossing**
1978	8	Not available	Not available
1979	5	390	140
1980	7	410	160
1981	7	410	160
1982	5	410	160
1983	14	500	160
1984	13	Not available	Not available

Sources: *Capitol Reef NP
**Creamer-Noble Report

AGENCY RESPONSIBILITIES AND MANDATES

Federal land ownership along the roadway:

Administered by National Park Service (NPS)	
Within Capitol Reef National Park	8.4 miles
Within Glen Canyon National Recreation Area	7.6 miles
Total NPS	16.0 miles
Administered by Bureau of Land Management (BLM)	
From Boulder to the west boundary of Capitol Reef National Park	30.7 miles
From the east boundary of Capitol Reef National Park to the boundary of Glen Canyon National Recreation Area	19.2 miles
Total BLM	49.9 miles
Total NPS and BLM	65.9 miles

There are 6 sections of Utah state lands traversed by the Boulder-to-Bullfrog road. Although the exact lengths of roadway within these sections have not been determined, they are estimated to total between 2 and 3 miles. There are no private lands adjacent to the unpaved portions of the Boulder-to-Bullfrog road.

NATIONAL PARK SERVICE

Two areas administered by the National Park Service (NPS) are directly affected by the proposal to pave the Boulder-to-Bullfrog road. They are Capitol Reef National Park and Glen Canyon National Recreation Area. Both areas are managed in accordance with the Act of August 25, 1916 creating the National Park Service, wherein the Service is directed to "conserve the scenery and the natural and historic objects and the wildlife therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations."

Capitol Reef National Park is within portions of four counties in south-central Utah, and is composed of over 222,000 acres of Federal land and over 19,000 acres of state-owned land. It includes narrow, high-walled gorges cutting through a fault zone called the Waterpocket Fold, forming sandstone cliffs with colorful sedimentary features, often dome-shaped. The portion of the Boulder-to-Bullfrog road in the park has traditionally been known as the Burr Trail.

The General Management Plan (GMP) for Capitol Reef National Park was approved in 1982. The summary of issues and considerations that follows is condensed from the GMP, and from other sources.

1. Mineral resources near the park include tar sand deposits in the Circle Cliffs area, coal deposits in the Henry Mountain area, oil and gas potential from the Overthrust Belt north of the park, and uranium deposits at two locations near the park. Exploitation of these resources may have impacts on the nature and extent of traffic on the Boulder-to-Bullfrog road.

2. Power generation facilities have been proposed at two sites not far from the park. The legislation authorizing expansion of Capitol Reef's boundaries (Act of December 18, 1971) provided for the granting of utility easements and rights-of-way ". . . upon, over, under, across, or along any component of the park . . ." unless ". . . significant adverse effects . . ." would result. There is no use of the Burr Trail section of the Boulder-to-Bullfrog road as a utility corridor at this time.

3. Regarding road improvement (including the Burr Trail), the GMP for the park has this to say: "It is not in the interest of the Park Service to finance improvements of the through-roads in the South and North districts during the lifetime of this plan. Should the county and/or state propose improvements to any of these roads, the Park Service will retain a voice in the design of these roads and in the regulation of traffic on them within the park to protect the park lands, resources, and visitors." The document goes on to say: "Improved roads will retain their existing alignments, with the possible exception of realignment in steep terrain near the park boundary east of The Post." Page 37 of the GMP has more detailed comment on these possible road improvement considerations.

4. The majority of the Boulder-to-Bullfrog road in Capitol Reef National Park passes through a narrow corridor that divides the recommended wilderness area. According to the park's GMP, this wilderness area ". . . contains undeveloped land of primeval character and influence and no permanent improvements or human habitation . . ." and it ". . . will be managed to preserve its natural condition." A change in the road condition and the corresponding increase in use could alter the feeling of solitude and isolation that is associated with the area.

5. The park's GMP discusses the need for NPS facilities in the vicinity of the Burr Trail switchbacks once the visitation increases to warrant this service. These facilities include a ranger station, utility and maintenance area, and well, situated to the east of the Burr Trail switchbacks, and a 10-site dry campground along the road near the western boundary. Paving the road may give impetus to the development of park facilities.

6. In 1984 and 1985 the state of Utah Wildlife Resources Division and Capitol Reef National Park transplanted desert bighorn sheep into the Hall's Creek drainage south of the Burr Trail in accordance with the plans in the GMP. Some of the animals have moved through the area around the switchbacks and along the road.

Glen Canyon National Recreation Area straddles the border between Arizona and Utah. The portion of the national recreation area that includes the road leading to Capitol Reef National Park to the northwest is entirely within Garfield County, Utah. The national recreation area encompasses Lake Powell, which was created by damming the Colorado River.

Bullfrog Basin, the southern terminus of the Boulder-to-Bullfrog road, is a developed area on the shore of Lake Powell, with support facilities for water-oriented recreation. A concession-operated resort is there, including a lodge, trailer village, boat rentals, stores, and restaurants. The Park Service operates a ranger station, a campground, a picnic area, a boat launching ramp, and a landing strip, all in the Bullfrog Basin area.

The Statement for Management for Glen Canyon National Recreation Area was approved in 1981. The following summary of issues and considerations is condensed from that document, and from other sources.

1. The national recreation area is operated by the NPS under an extensive series of cooperative agreements and various legislatively-mandated agreements and permits. A concession contract, issued to Bullfrog Resort and Marina, Inc., provides for visitor services in the Bullfrog area.

2. The Statement for Management for Glen Canyon National Recreation Area expresses concern about future extraction of certain minerals. "The region has rich deposits of coal, oil and gas reserves that to date have not been developed. Intensive development of these resources may become economically feasible and a reality within the next decade, thus changing and intensifying outside the influences on both environmental and social factors affecting the area." Fairly extensive gravel deposits occur in the Bullfrog area. There would undoubtedly be interest in this resource if the the Boulder-to-Bullfrog road proposal is implemented.

3. The concessioner at Bullfrog Basin is under the general management of the Del E. Webb Recreation Properties, Inc. That organization is especially interested in the effects that upgrading the Boulder-to-Bullfrog road would have on patterns of visitor use in the area.

4. The national recreation area's Statement for Management expresses concern about the impacts of increasing tourism in general, e.g. "Increased visitation coupled with easier access to previously unexplored shorelines has resulted in the vandalism and destruction of some cultural resources." Also "There is a need to insure that the area does not become congested to the point that the experience of visitors seeking solitude is jeopardized."

5. When the national recreation area was established, Congress required that ". . . easements and rights-of-way within the recreation area . . ." be granted as long as no significant adverse effects ". . . on administration for recreation purposes" would obtain. At the present time a generating plant at Bullfrog Basin provides electricity for the area. A power plant at Boulder (Garkane Power Co.) apparently has the potential to provide Bullfrog with sufficient power to eliminate the need for the plant there.

BUREAU OF LAND MANAGEMENT

Two Bureau of Land Management districts are directly affected by the Boulder-to-Bullfrog road. They are the Richfield District to the east, and the Cedar City District to the west. Over three-quarters of the roadway traverses the two districts.

Management direction for the BLM is based on the Federal Land Policy Management Act of 1976 (FLPMA). With FLPMA, the national policy was established providing for management under the principles of multiple use and sustained yield.

The BLM's primary management interests relating to the Boulder-to-Bullfrog road are the two Wilderness Study Areas (WSA's) near the roadway. They are the Steep Creek WSA and the North Escalante Canyon/The Gulch Instant Study Area (ISA). Both are in the Escalante Resource Area of the Cedar City District.

Under FLPMA, wilderness preservation is part of BLM's multiple-use mandate, and wilderness values are recognized as part of the spectrum of resource values and uses to be considered during the evaluation period for WSA's. Section 603(c) of FLPMA guides the BLM in managing the lands under wilderness review; "During the period of review of such areas and until Congress has determined otherwise, the Secretary (of the Interior) shall continue to manage such lands according to this Act and other applicable law in a manner so as not to impair the suitability of such areas for preservation as wilderness . . ." For more detailed information, refer to "Interim Management Policy and Guidelines for Lands Under Wilderness Review," BLM, December 1979.

Both the North Escalante Canyon/The Gulch ISA and the Steep Creek WSA have boundaries near the edge of the Boulder-to-Bullfrog roadway.

There are other agency (BLM) concerns. Effects on wildlife (especially game species and bison) if the road is paved are potentially significant. There is a strong likelihood that visitor use patterns would change, having impacts on recreational facilities. Open-range grazing by cattle must be considered. In both the Steep Creek WSA and the North Escalante Canyon/The Gulch ISA, uranium exploration and development could conflict with wilderness designation. And development of tar sand resources is a concern. Reference should be made to the appropriate Land Use Plans (BLM).

The route of the road from Bullfrog to the eastern boundary of Capitol Reef National Park has been designated in The Henry Mountain Management Framework Plan as a travel and utility corridor. The portion of the road from the western boundary of the park to the town of Boulder is covered by the Escalante Management Framework Plan; however, the plan does not address activities relating to the Boulder-to-Bullfrog road.

STATE OF UTAH

The state of Utah owns six sections of land that include portions of the Boulder-to-Bullfrog Road. Two sections encompass environmentally critical portions of the road; in Capitol Reef National Park the Burr Trail switchbacks are on state land, and in the Escalante Resource area (BLM) some of the roadway through Long Canyon is state owned.

These lands are subject to the provisions of the Act of December 18, 1971 which states that ". . . lands or interest therein owned by the State of Utah . . . may be acquired only with the approval of . . ." the state. In 1981 the state initiated a land exchange proposal ("Project BOLD") with the Federal government that would combine scattered land sections into more managable units. If exchanges take place as visualized in the most recent discussion draft (1983) of Project BOLD legislation, all state sections through which the Boulder-to-Bullfrog road crosses would become Federal lands (BLM and NPS).

The state of Utah has generally supported improvements to the Boulder-to Bullfrog road, including recent funding of about $600,000 for engineering studies, contingent on Federal matching funds. Possible state interests and influences could include:

1. Possible input by the Utah Department of Transportation regarding design of an improved roadway.

2. Future maintenance responsibilities for the road.

3. Constraints placed on the scope of the proposed project by resource agencies such as the Utah State Division of Wildlife Resources.

4. Leases or other commercial or non-commercial uses the state may place on their lands adjacent to the Boulder-to-Bullfrog road.

GARFIELD COUNTY AND OTHER SOUTHERN UTAH COUNTIES

Garfield County is a member of the Five County Association of Governments. Although the county owns no land along the Boulder-to-Bullfrog road, its interests are considerable there. The county maintains the entire length of the road and it may continue to do so if the road is paved. The county's concerns are perhaps best stated in the following quote extracted from the Creamer-Noble report.

> The proposed central link of the Grand Circle Adventure in Utah is a slow speed all-weather scenic road from the town of Boulder to Bullfrog Basin on Lake Powell. This scenic road would provide access to the canyon country of Southern Utah which has previously been limited due to frequent poor road conditions. Combined with the new Lake Powell ferry boat transportation system, funded by the Congress and the State of Utah in 1984, the Boulder-Bullfrog scenic road would provide tourists year-round access to the wonders of the Grand Circle canyon country.
>
> An additional benefit derived from improving the Boulder-Bullfrog scenic road is the economic improvement it will offer residents of Garfield County. While the benefit is considered secondary to the overall project, it is one of primary concern to Garfield County and to the state of Utah. The increased tourism generated in Garfield County by an all-weather road will play a substantial role in providing new employment positions in an area plagued by high unemployment.

GENERAL ISSUES

1. Desert conditions generally prevail near the Boulder-to-Bullfrog road. Consequently, road construction and improvement proposals must take into account highly erodible soils, inadequate ground water supplies, fragile vegetative growth, and occasionally temperature extremes.

2. Human occupation of the Waterpocket Fold area began over a thousand years ago. A succession of American Indian groups left petroglyphs and other cultural evidence of their presence. There are a number of such cultural sites located near the Boulder-to-Bullfrog road, but a complete archeological survey of the area is lacking.

3. An improved Boulder-to-Bullfrog roadway would probably require increased attention by all agencies to patrol activities for visitor safety and for law enforcement.

4. Threatened and endangered species occur in the area. The NPS and BLM reflect a management stance wherein all adverse impacts to these plant and animal species will be avoided.

5. Air quality of the region is high. Capitol Reef National Park is a Class I area under the Clean Air Act. Fugitive dust is an existing impact and a potential issue.

6. The remote, rather primitive nature of the existing Boulder-to-Bullfrog road and adjacent lands has caused some concern about impacts on "wilderness values." A clear understanding is needed of the relationship that a paved road would have to "wilderness." Later, this assessment also raises this issue as it relates to specific wilderness proposals.

ALTERNATIVES

OVERVIEW OF ALTERNATIVES

The following is a brief description of the alternatives considered for detailed analysis. A table comparing the engineering considerations for all the alternatives follows this overview.

Alternative I-a. Pave entire route. This is the project as advocated by the Five County Association of Governments. The road would be paved for its entire 66-mile length. It would be designed as a scenic road only, with a 10 to 40 mile per hour speed limit, and would follow the existing alignment except in areas where safety and design criteria dictate otherwise.

Alternative I-b. Pave entire route. This would be the project similar to Alternative I-a, but as envisioned by engineers from the Federal Highway Administration. Some conceptual and engineering differences exist between the two subalternatives, and will be discussed.

Alternative II. Gravel entire route. This alternative is essentially the same as I-b, except that the road would be gravel-surfaced rather than paved.

Alternative III. Limited improvement. Under this alternative, the road would not be paved, but would receive enough improvement to make it passable for two-wheel-drive vehicles approximately 90 percent of the time. It would involve increasing the gravel base in several places and installing culverts and paved dips where necessary. One bridge and one realignment segment would be included.

Alternative IV. No action. In this alternative, no major paving or other improvements would be done. Garfield County would continue existing levels of maintenance, including its limiting paving program. The road would remain nearly impassable during wet weather, and the Bullfrog Creek crossing would continue to be periodically inundated by Lake Powell.

ALTERNATIVE CONSIDERED BUT ELIMINATED

There were preliminary discussions on an alternative to meet the perceived objectives of paving the Boulder-to-Bullfrog road by improving another road or roads. For example, paving the Notom Road would complete a loop with the recently-paved Boulder/Grover Road and U-24. However, while discussion of this proposed alternative is potentially valid, it does not answer the immediate need to analyze the environmental consequences of the proposed paving of the Boulder-to-Bullfrog road.

COMPARISON OF ALTERNATIVES - BOULDER-TO-BULLFROG ROAD - ENGINEERING CONSIDERATIONS

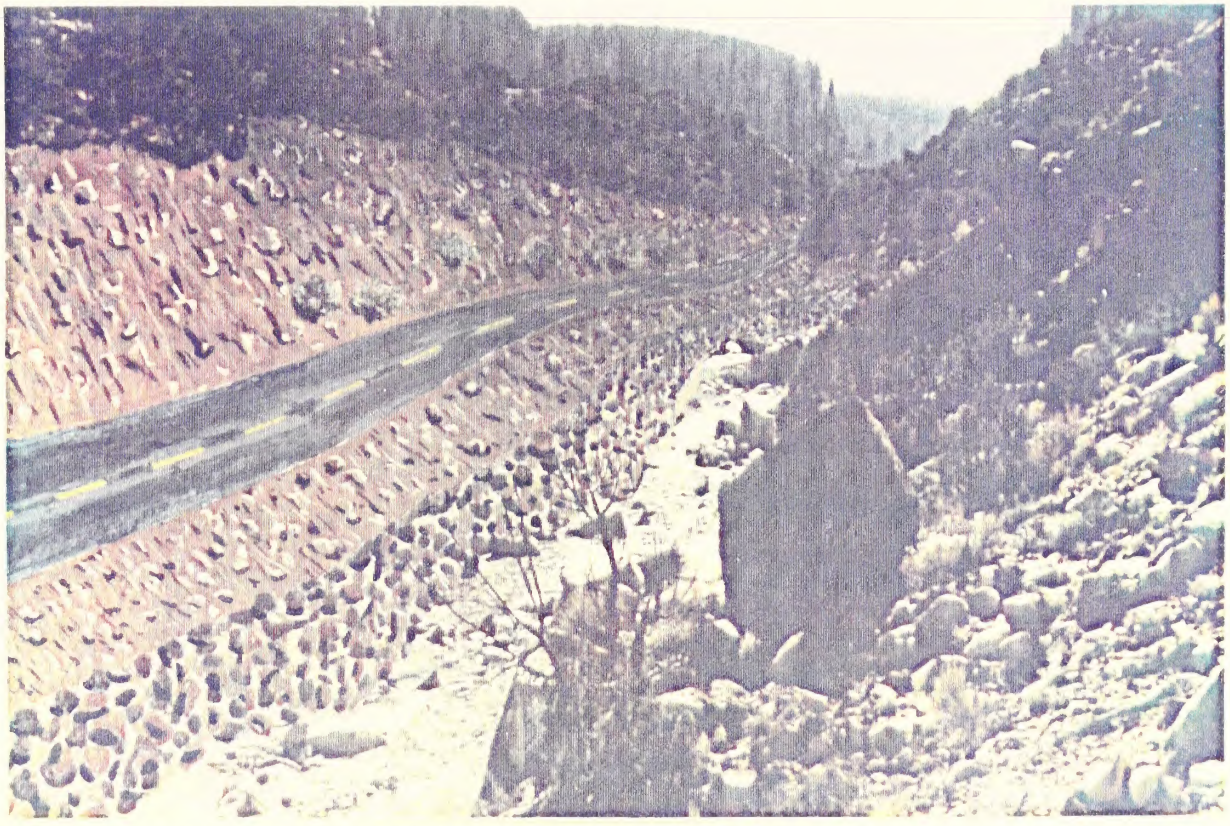
Alternative	Road Surface	Road Width	Design Speed	Realignments	Grades
I-a Pave entire route	Bituminous	26 feet	30-40 mph (15-20 at switchbacks)	The Gulch (extensive) Muley Twist Wash (minor) Near east boundary of Capitol Reef NP (extensive)	Maximum 8% exceptions: Approach to The Gulch - 10½% Long Canyon - 9% Between Long Canyon & Horse Canyon - 10% Switchbacks - 11-13%
I-b Pave entire route	Bituminous	26 feet (20'+ on switchbacks)	30-40 mph (15-20 at The Gulch & Muley Twist Wash, and 5-10 mph at switchbacks)	The Gulch (extensive) Muley Twist Wash (minor) Halls Creek (minor) Near east boundary of Capitol Reef NP (extensive)	Maximum 8% exceptions: Approach to The Gulch - 10-11% Long Canyon - 8-10% Between Long Canyon & Horse Canyon - 9-10% Switchbacks - 11-13% Deer Creek valley & Muley Twist Wash (portion) - 8-10%
II Gravel entire route	Gravel	26 feet (20'+ on switchbacks)	As I-b	As I-b	As I-b
III Limited improvement	Gravel and dirt	Retain existing widths	20-35 mph (5-10 mph at The Gulch, Muley Twist Wash, & Switchbacks)	Near east boundary of Capitol Reef NP (extensive)	Retain existing grades
IV No action	Gravel and dirt	Retain existing widths	20-35 mph (less at many locations)	None	No changes

COMPARISON OF ALTERNATIVES - BOULDER-TO-BULLFROG ROAD - ENGINEERING CONSIDERATIONS

Alternative	Bridge Locations	Total Bridge Length*	Other Drainage Features
I-a Pave entire route	Deer Creek	50 feet	Culverts in several drainages; slotted drains on switchbacks
	The Gulch	120 feet	
	Horse Canyon	40 feet	
	Muley Twist	50 feet	
	Halls Creek	50 feet	
	Bullfrog Creek	150 feet	
I-b Pave entire route	Deer Creek	120 feet	Culverts in several drainages; paved (concrete) ditch with inner curb on switchbacks
	The Gulch	150 feet	
	Horse Canyon	100 feet	
	Muley Twist	85 feet	
	Halls Creek	135 feet	
	Bullfrog Creek	215 feet	
II Gravel entire route	As I-b	As I-b	As I-b
III Limited improvement	Bullfrog Creek Retain existing wooden bridge at Horse Canyon	215 feet	Paved dips or culverts in drainage crossings
IV No action	Retain existing wooden bridge at Horse Canyon	--	Continue existing levels of repair and improvement on drainage devices

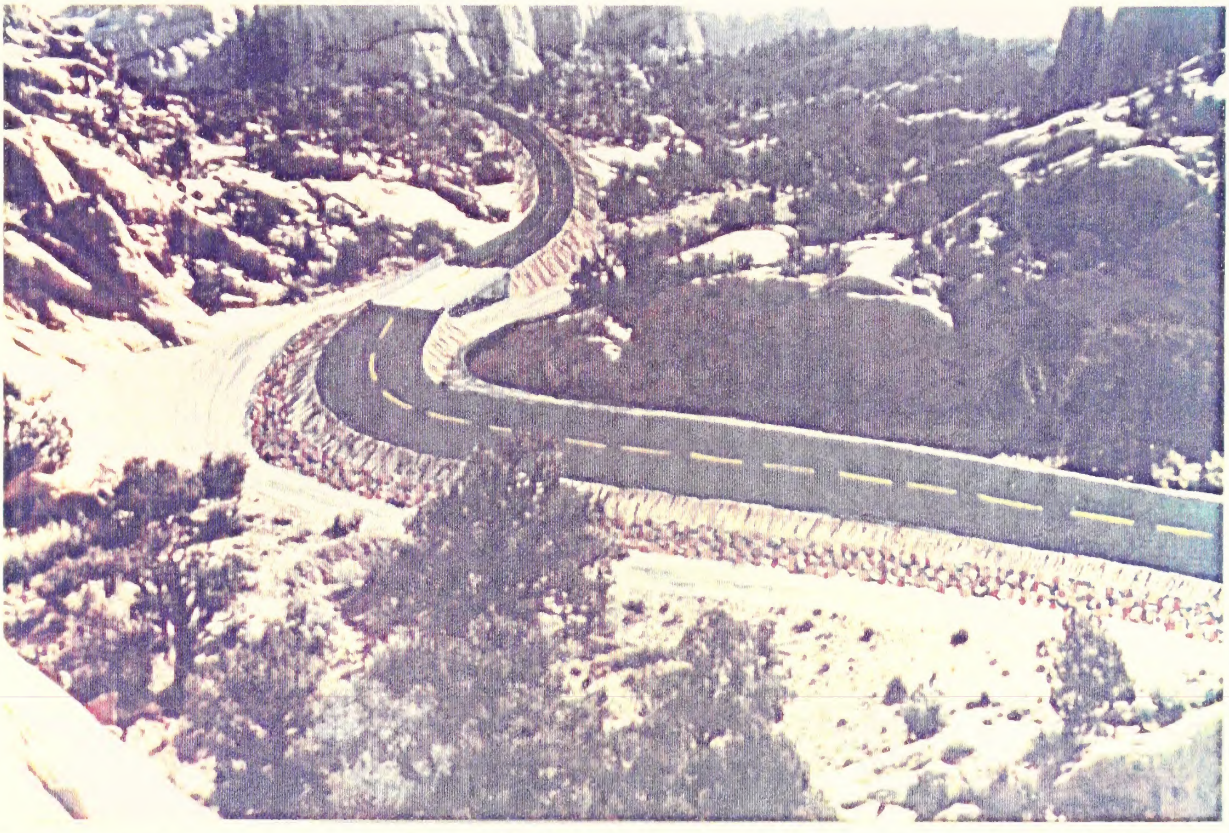
*Total bridge lengths are based on runoff data that are preliminary only. Considerable engineering work would be required before precise bridge specifications can be developed.

The existing road in Long Canyon follows a narrow, spectacular route just west of Circle Cliffs.

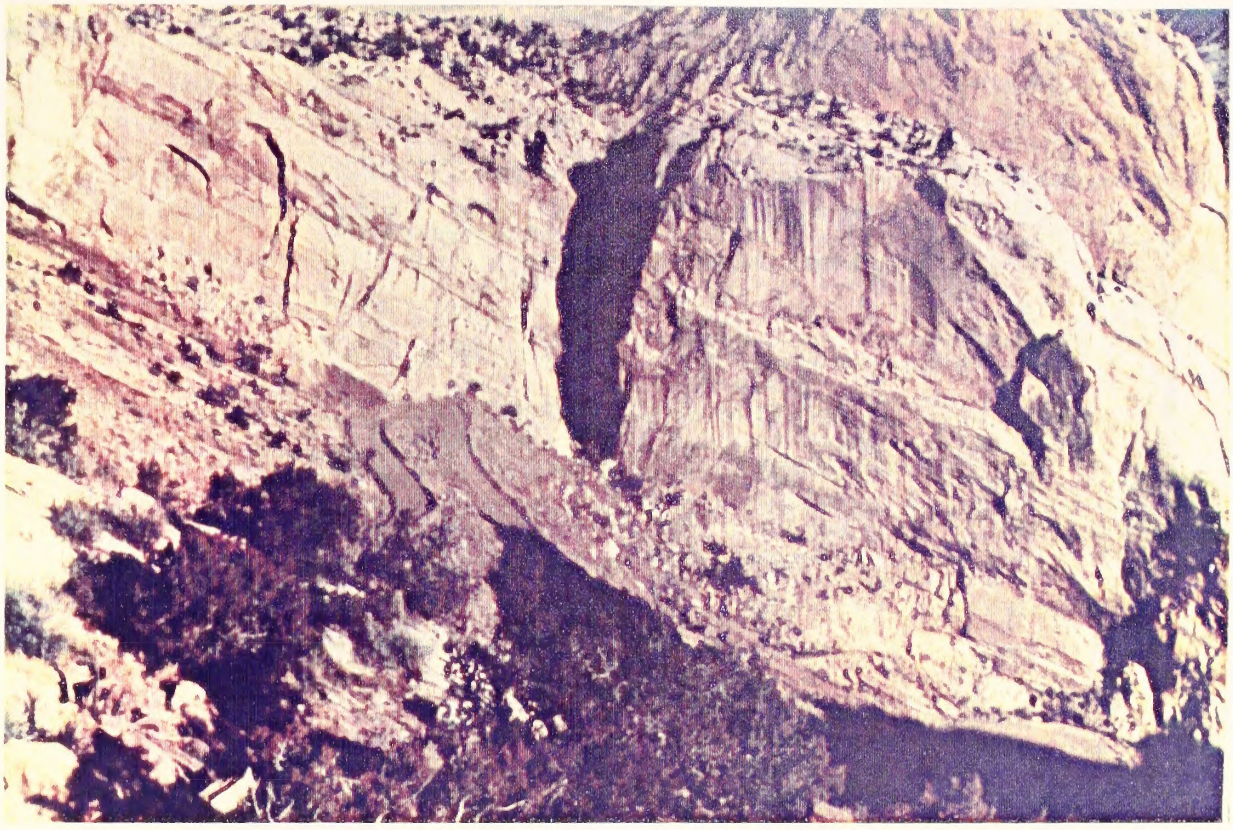


Under Alternative 1, the road through Long Canyon would require substantial reconstruction to accommodate both the roadway and the stream channel within the narrow confines of the canyon walls.

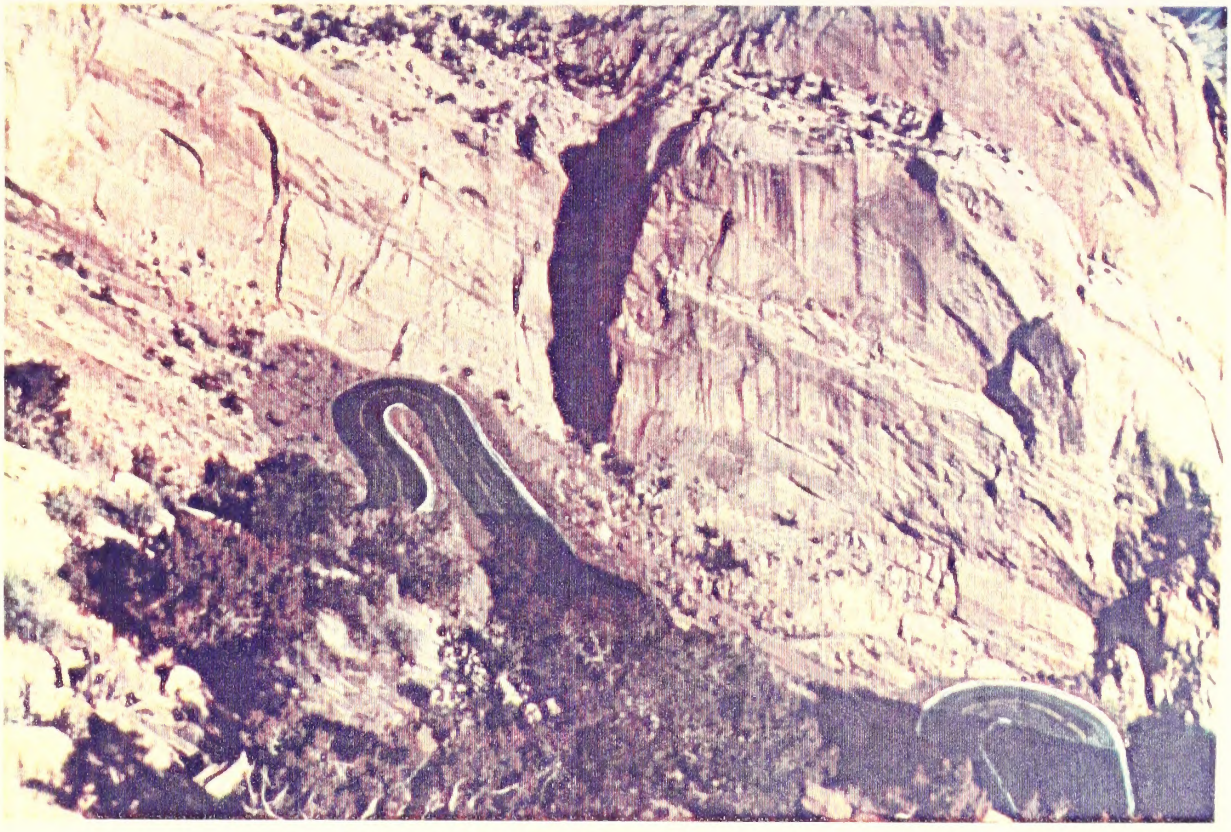
Muley Twist Wash is a torturous route through the Waterpocket Fold. At times the present road is in the bottom of the stream bed.



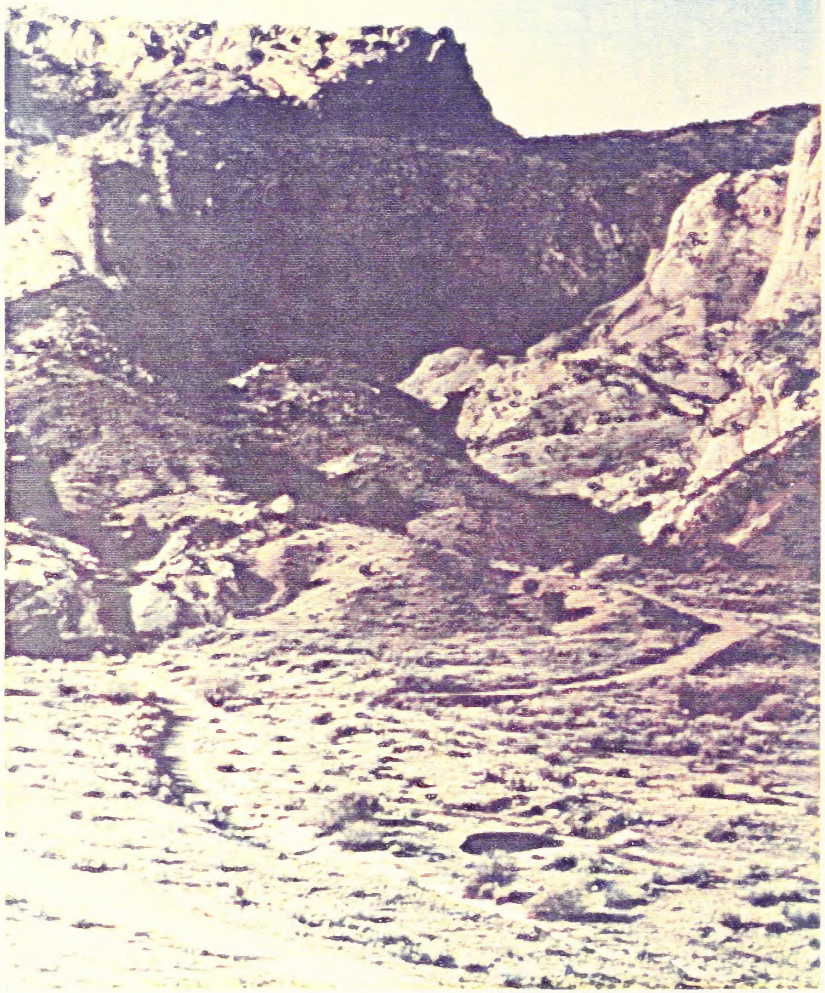
Alternative I proposes bridging Muley Twist Wash and armor-plating the road to preserve the drainage channel and protect the road.
Option: No bridge; rechannel stream bed.



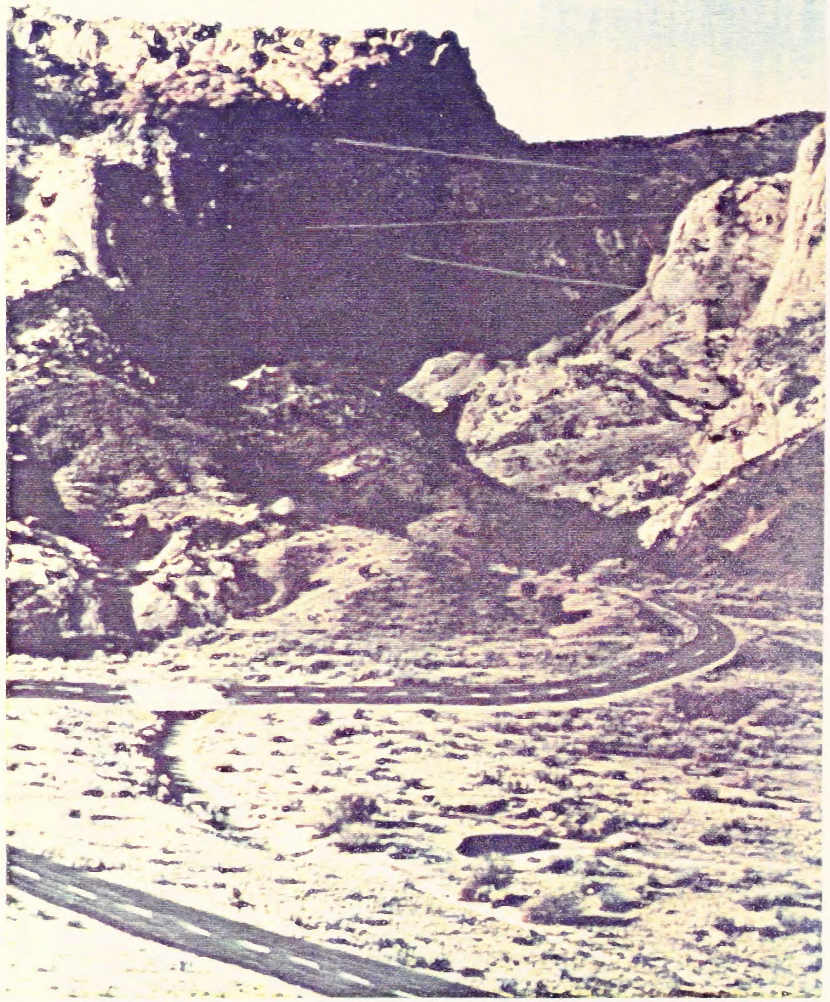
The switchbacks on the east face of Waterpocket Fold are probably the most prominent feature of the Boulder-to-Bullfrog road.



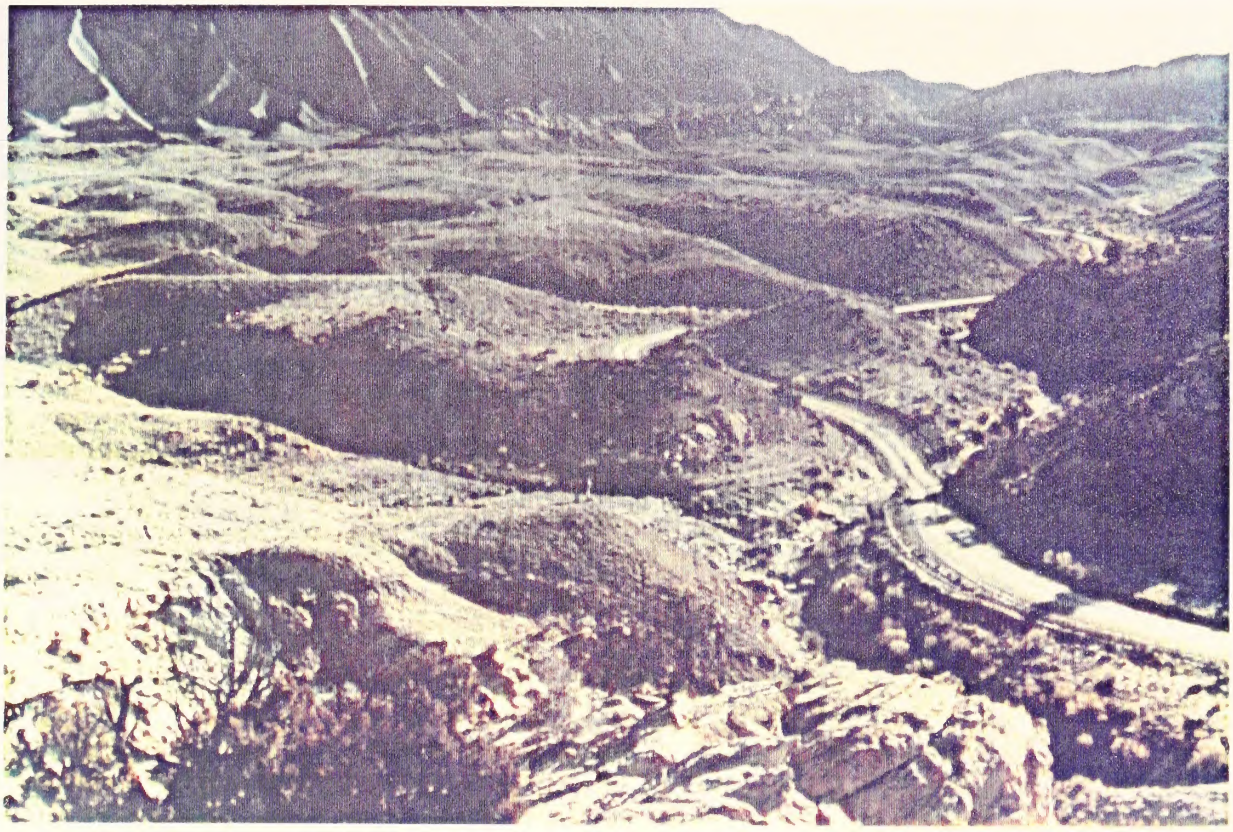
Under Alternative I the "Burr Trail" switchbacks could only receive minimal widening and the steep grade would have to be maintained. Except for paving, this would be true for all other alternatives.



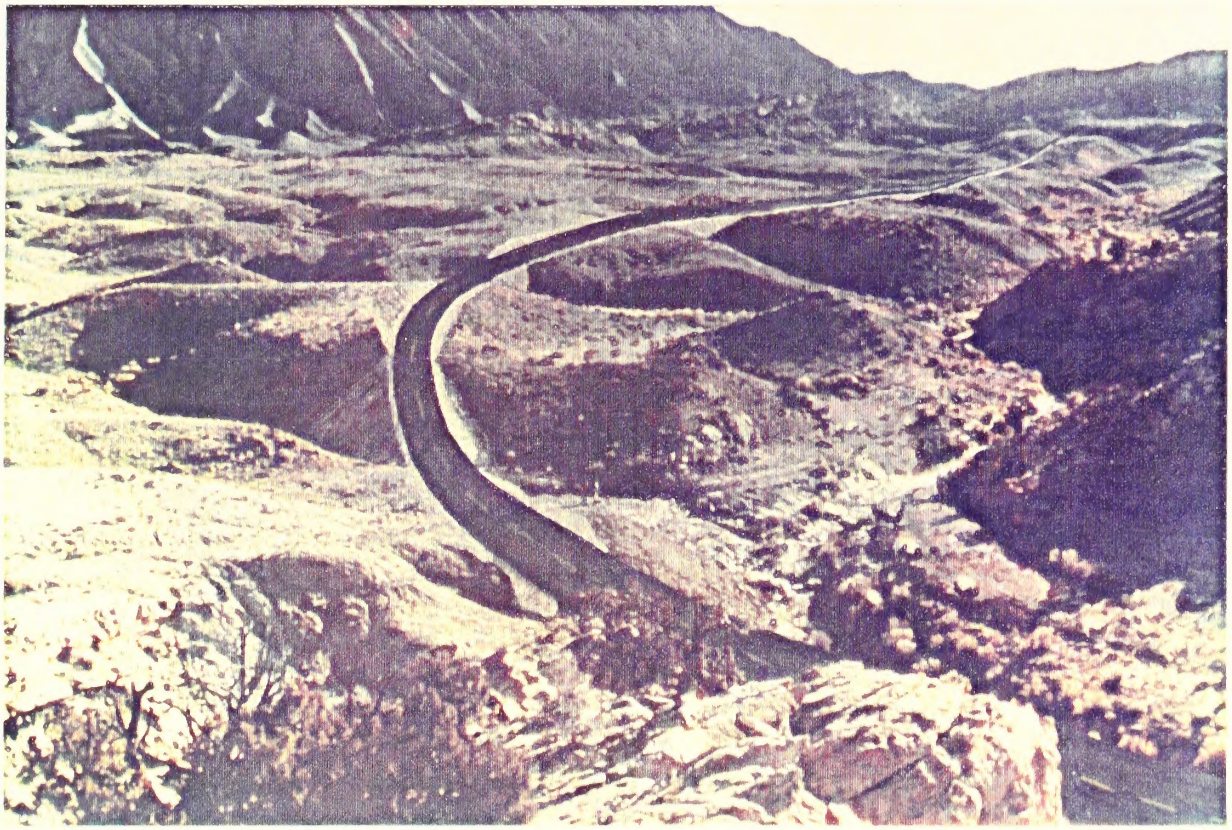
The existing road crosses Halls Creek and offers an imposing approach to the "Burr Trail" crossing of the Waterpocket Fold.



Under Alternative I, a bridge is proposed over Halls Creek, and the switchbacks up the Waterpocket Fold would be much more prominent.

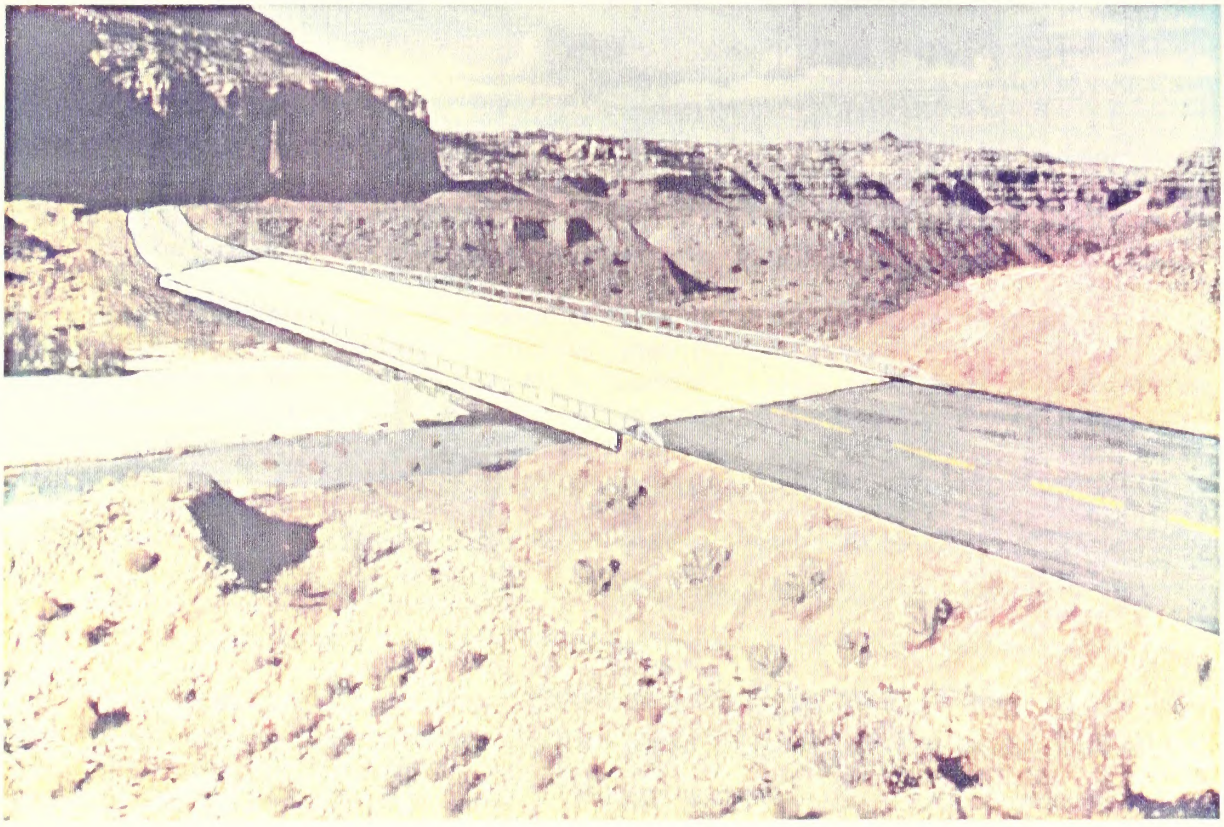


Within Capitol Reef National Park, the existing road follows Halls Creek, crossing it several times.



Alternative I proposes to realign over a mile of roadway to avoid stream crossings and flooding associated with Halls Creek. Alternatives II and III propose similar realignment without pavement.

The existing road crossing at Bullfrog Creek is subject to flooding whenever Lake Powell reaches flood pool level.



Alternative I proposes a substantial bridge at Bullfrog Creek. A bridge is also proposed here for Alternatives II and III.

DESCRIPTION OF THE ALTERNATIVES

Alternative I-a and I-b. Pave entire route

The concept is for a low speed (about 30 to 40 miles per hour) paved scenic road with a typical 26-foot roadbed. There would be sections in areas where maximum safe speeds could be as low as 5 or 10 miles per hour. See the Appendix for engineering and design concepts.

For descriptive purposes, the road has been divided into four sections:

Section 1. The roadway from the town of Boulder to the west boundary of Capitol Reef National Park.

Section 2. The roadway within Capitol Reef National Park.

Section 3. The roadway from the east boundary of Capitol Reef National Park to the west boundary of Glen Canyon National Recreation Area.

Section 4. The roadway within Glen Canyon National Recreation Area.

Alternative I-a. Pave entire route

This is the proposed action by the Five County Association of Governments prepared by Creamer and Noble Engineers.

Section 1

About 2.7 miles of the Boulder-to-Bullfrog road just east of Boulder have been paved for light vehicle traffic to an average width of 21 feet. This was accomplished by Garfield County, and they intend to continue to improve that portion of the road in the future.

Beyond the pavement the roadway continues about 4 miles southeasterly to Deer Creek. The terrain consists mainly of gently rolling hills with sparse vegetation. Through this section, the road prism would be reconstructed to provide an even grade and would be widened to accept the standard 26-foot pavement section. In this area, two major wash crossings would require installation of large diameter drainage culverts to facilitate proper drainage. In addition, several smaller culverts would be required in selected areas and to provide proper subgrade drainage for the paved section. Throughout this area, reconstruction would require no large cuts or fills and no clearing of existing vegetation would be required for reconstruction.

The Deer Creek drainage has a fairly wide valley floor with moderately sloping sides. A new bridge is planned to cross the creek, and minor road alignment with some placement of fill would be required for the approaches to the bridge.

The roadway then climbs out of the Deer Creek drainage and traverses for 4 miles to another area of rolling hills and flat lands. The existing

road follows the contour of the ground, resulting in an undulating roadway. To alleviate this problem, the road subgrade would be reconstructed using cuts and fills in order to improve the overall road gradient. The subgrade would be widened to accept the new wider roadway pavement section of 26 feet. Small culverts would be installed in many of the fill areas to provide passage under the roadway for drainage.

There are no large washes or major drainage paths which cross the roadway in this area until the road descends into the bottom of The Gulch via a proposed bridge. At the approach to The Gulch, major road realignment would be required to improve safety. Substantial rock cuts and fills would be required along the road subgrade in The Gulch area; only moderate excavation would be necessary elsewhere. There would be no clearing of vegetation required in order to accommodate the road in this section.

After crossing the stream in the bottom of The Gulch, the roadway climbs about 6 miles through the bottom of Long Canyon, a steep, high-walled canyon. It is characterized by vertical red sandstone cliffs up to 200 feet high and a narrow valley ranging in width from 300 feet to one-half mile. This section of road would require significant reconstruction to widen, realign, and elevate the road prism out of the immediate flood zone. The major design challenge through this section would be to accommodate both the roadway and the flood channel within the narrow confines of the canyon walls. To improve grades and widen the subbase of the existing road, it would be necessary to perform large scale channel improvements to provide proper drainage and flood protection through the canyon. Cuts and fills would be required in some areas to form a channel for the drainage water and to improve horizontal and vertical alignment of the existing road. Clearing of some vegetation would be required. Riprap protection of the road fill would be necessary to prevent flood damage.

From the head of Long Canyon the roadway enters the Circle Cliffs basin and follows a steep grade downward for about 1½ miles along a slope into the valley bottom. Side slopes in the area are steep and severe and would require some bank-cut construction to widen the existing roadway. Soils through this area are fairly poor clays, and the vegetation on the Horse Canyon valley floor, a major drainage, is mainly scattered brush. A bridge is planned here.

Thereafter, the road passes through rolling hills and gentle terrain to the border of Capitol Reef National Park, a distance of approximately 13 miles. Road grades and side slopes are mild, and vegetation near the roadway is sparse. Some small cuts and fills would be required to balance the grade along the roadway in the more hilly areas. At selected sites fills have been planned in order to raise the grade of the roadway sufficiently to provide proper drainage and eliminate flooding problems. As the road nears the park boundary, there would be some widening of the presently tight horizontal curves for safety purposes.

Section 2

The Boulder-to-Bullfrog road enters Capitol Reef National Park at its westerly boundary. The road (known here as the Burr Trail) proceeds from the boundary to the top of Waterpocket Fold. The road follows the top of a ridge and overlooks the scenic Waterpocket Fold, which is also the trailhead for the Muley Twist Canyon trail system. It traverses rolling hills which slope into the fold. Reconstruction on this 3-mile length of road to the Muley Twist drainage would be done within the existing roadway alignment. The subgrade would be widened and reconstructed to provide a smooth and even grade. In this section, all materials for construction would be brought in from outside the National Park, and excess excavation material, if any, would be removed from the park for disposal.

There are two major drainage crossings of the Muley Twist Wash located at the top of Waterpocket Fold in the Muley Twist drainage. Here, earthwork consisting of a series of cuts and fills, and a bridge, would be used through the Muley Twist Wash crossing in order to preserve the drainage channel and properly protect the road from flooding.

The road then proceeds for about 2 miles from the top of Waterpocket Fold to the junction of the Notom road and the Burr Trail Road. From the top of Waterpocket Fold, the road consists of a series of steep switchbacks with an average roadway width of approximately 20 feet. Grades are increased to 10 to 14 percent in this section and side slopes are steep. In this switchback area, the road would be reconstructed following the existing roadway prism. The roadway would be widened in narrow segments and at the switchbacks wherever possible in order to allow bus and truck traffic along the road. Because major realignment of the road is not possible, the existing steep grade along this road would be maintained. Slotted drains could be installed underground (in place of ditches) on the inside portion of the roadway, permitting the entire width of the road to be paved. A barrier would be installed outside of the roadway for safety purposes, and the road would be signed for 10 mph maximum speed. In order to maintain the standard width and widen the turns along the switchbacks, rock excavation would be required. The bedrock above the road is not stable. Culverts would be installed at the lower elevations in Waterpocket Fold to provide proper drainage for those areas.

The only major drainage crossing in the area is at Halls Creek at the foot of the Fold, where a bridge is proposed. Once to the bottom of the Fold, the terrain becomes much flatter; grades and side slopes along the road are mild.

From the junction of the Notom Road and the Burr Trail, the roadway proceeds for 5 miles to the eastern boundary of Capitol Reef National Park. The roadway from the Notom Road/Burr Trail junction to The Post would need little preparation, as the present road width through this area is 30 feet. Although there are no major drainage problems through this area, the road grade elevation is low through some spots and would require filling in order to provide proper drainage of the roadway. There would need to be some channelization of Hall's Creek for a distance

of 200 feet in two locations and riprap along the roadway to protect the road surface.

The roadway from The Post south to the park boundary generally follows the course of Halls Creek. In one 6,000-foot section, the road crosses the drainage path eight times. In order to alleviate this problem, an option would call for realignment of about 6,000 feet of roadway along rolling terrain northeast of the existing road. This realignment of the road would extend laterally a maximum of 500 feet from the existing roadway in a parallel configuration. This new alignment would require some medium construction equipment and methods. With the exception of this realignment, all work within the park would be done following the existing roadway. The existing roadway, where abandoned, would be restored back to natural condition.

Section 3

After leaving the east boundary of Capitol Reef National Park, the Boulder-to-Bullfrog road runs southeasterly about 19 miles to the north boundary of the Glen Canyon National Recreation Area. Through this section the roadway traverses the high desert country which is common in southern Utah, and is characterized by flat rolling hills with occasional deep gorges cut by wind and water. The Bureau of Land Management administers the land in this area.

The roadway proceeds from Capitol Reef National Park to what is known as the Stratton Road section. Through this area the roadway is constructed on generally flat to rolling hill country. Grades and side slopes are generally mild to moderate. For the most part, the existing alignment of the road is acceptable and would require no realignment; however, realignment may be required in some areas to improve sight distances and to eliminate sharp curves. These realignments would be of a minor nature; however, some reconstruction would be necessary to flatten the road grade. The subgrade would require widening to the standard road width selected. Cuts, fills, and drainage earthwork through this section of road would be minor, as no major drainage channels are located along the road. Minor draws and drainage areas would be accommodated by the installation of drainage culverts under the road.

From the Stratton Road junction to the boundary of the Glen Canyon National Recreation Area the roadway takes on a somewhat different character. In 1967 the Utah Department of Transportation issued a contract to improve grades and drainages along this portion of the roadway. As a result, the present grades in the area are acceptable and would require little reconstruction except for widening in selected areas. Drainage culverts were installed in all major drainages throughout this region. However, because of the highly corrosive soils present there, approximately 50 percent of these culverts are in poor repair and would require complete replacement. Those which are usable would require extensions to accommodate the wider subgrade that is planned. The present subgrade along this part of the roadway has average widths of approximately 30 feet along fill areas and approximately 38 feet in cut

areas. It is anticipated that little major earthwork would be required for this section of road. However, it would be necessary to import free-draining base material to enhance structural capacities over the predominent clay soils.

Section 4

As the Boulder-to-Bullfrog road enters Glen Canyon National Recreation Area and proceeds along a mesa west of Bullfrog Creek Canyon, the terrain begins to undergo subtle changes. Although the countryside is still generally flat or gently rolling, the high plateaus are cut by increasingly deeper and more rugged sandstone canyons as the road approaches Lake Powell. Reconstruction of the subgrade in this area would require minor earthwork and realignment of the roadway surface. Minor widening of the subgrade would be accomplished; the present subgrade is 30 feet wide in both cut and fill areas. Culverts are in place and would require extensions on both sides in fill areas to provide adequate drainage.

The crossing at Bullfrog Creek becomes impassable whenever Lake Powell reaches flood pool level. A major bridge structure would be constructed here.

After crossing Bullfrog Creek, the roadway parallels the shore of Lake Powell across relatively flat terrain for a distance of approximately 5 miles. In this section of road, there is one major side canyon draining into Lake Powell. A 14-foot multi-plate pipe has previously been installed for drainage. However, this structure would require a 20-foot extension on each side as the road is widened. The road alignment and grade in this section are generally good. However, there is one tight horizontal curve within the section which would be improved with a slight realignment. This is considered one of the more dangerous points on the road, and realignment around the curve would substantially improve safety.

Guardrails have been installed along the road through the national recreation area. As the roadway section is widened, the guardrails would need to be removed and replaced. Some salvage and reuse of the guardrail sections may be possible.

With the exception of the horizontal curve realignment mentioned previously, the road would be reconstructed entirely within the existing roadway prism. It is probable that only light construction would be required to widen the road subgrade. Because of the sandy soils in the area and the relative isolation of this section, some existing cut and fill slopes have deteriorated with time. These slopes would be reshaped and regraded as the roadway is reconstructed. The proposed reconstruction of the Boulder-to-Bullfrog road would end at the intersection with Highway 276, just north of the Bullfrog Basin developed area.

The Preliminary Engineering Report (Creamer and Noble) states that ". . . the typical pavement section for the major portion of the roadway length (is) to be comprised of 3 inches of bituminous surface course, 4

inches of untreated base course, and 6 inches of granular borrow." See the Appendix for typical roadway sections. The disturbed zone for road construction purposes, including the pavement, shoulders, drainage ditches, and adjacent modified slopes, would vary in width depending on the terrain and construction conditions encountered. The impacted zone could range from 50 feet to about 150 feet; an average of 100 feet is assumed for the purposes of this assessment.

Garfield County claims an existing right for use and maintenance of the present road. Activities considered to be within the purview of normal maintenance would be covered by that right which pre-dates FLPMA, the BLM Wilderness Study Policy, and the BLM Interim Management Policy. Therefore, reasonable reconstruction and maintenance activities could occur under prior existing right.

The Creamer and Noble report also includes a preliminary investigation of potential sources of aggregate. They reported that ". . . the investigation has shown that on both ends of the project substantial amounts of aggregate of excellent quality are available. On the interior of the project, another excellent aggregate source was located on the Bullfrog Creek drainage." (Note: This is at Eggnog, about 5 miles east of the Boulder-to-Bullfrog road on BLM land. Those sources at each end of the Boulder-to-Bullfrog road are near the town of Boulder and along Bullfrog Creek in the Glen Canyon National Recreation Area.) "At this site, the quality of the aggregate material is such that only granular borrow could be obtained." The report goes on to say that "a more detailed investigation will be made as the project enters into design."

Discussions with a Creamer and Noble engineer indicate that possible sites for batch plants include Eggnog and the town of Boulder. For construction camps, Eggnog and White Flat were mentioned. Site selection would depend primarily on the needs of the selected construction contractor. The Boulder town site is on private lands; Eggnog and White Flat are on lands administered by the BLM. The contractor would have to arrange for use of these sites.

Alternative I-b. Pave entire route

This is the Federal Highway Administration's engineering concept of the paving alternative. Refer to Alternative I-a for a basic description of the roadway, and to the Appendix for specifics on construction technique definitions and typical road sections. See the Comparison of Alternatives chart before the description of Alternative I-a for the description of differences between the alternatives.

Section 1

From the end of the pavement east of the town of Boulder to the Deer Creek drainage (about 4 miles), medium/light construction would be indicated. On the Deer Creek approaches (both directions) medium construction is required, and a bridge is planned.

Medium construction would then continue for about 4 miles to The Gulch switchbacks, where heavy construction would be necessary. On the approach from the west, realignment would be accomplished to place the road above the high water line. A bridge is proposed over The Gulch creek crossing.

As the road ascends Long Canyon (for about 6 miles) some medium and some heavy construction would be undertaken. The latter includes considerable amounts of stream channel alteration and riprap protection for the road.

For about 2 miles medium-to-heavy construction would be employed on the downgrade from Long Canyon to Horse Canyon, then for about 13 miles, medium construction and light construction would alternate to the western boundary of Capitol Reef National Park. Included in this alternative would be replacement of the existing wooden bridge at Horse Canyon by a culvert in the same location.

Section 2

From the western boundary of Capitol Reef National Park to the Muley Twist Wash area, a distance of about 3 miles, medium-to-medium/light construction techniques would apply. In the Muley Twist Wash, medium/heavy construction would be called for, and would include a bridge.

A two-mile section of road then leads from the top of the Waterpocket Fold down to the junction with the Notom Road. Heavy construction would be necessary to provide minimum 50-foot radius curves on the switchbacks and 20- to 26-foot road with minimal ditch area. The ditches (along the inner "cliff" side) would be curbed to assist drainage. At the base of the cliffs to the junction, medium construction would be proposed, with a bridge crossing at Halls Creek and possibly some channel alterations of the creek.

The roadway then proceeds for about 5 miles to the eastern boundary of Capitol Reef National Park. From the junction to The Post, light construction would be employed. From The Post to the boundary, medium construction would be necessary for a realignment of over a mile of roadway. The road could be realigned up to 500 feet laterally.

Section 3

From the boundary of Capitol Reef National Park to the boundary of Glen Canyon National Recreation Area (about 19 miles) light to medium/light construction is proposed. Existing alignment would be followed; the major engineering problem encountered would be poor soil conditions for paving purposes. Replacement of some culverts would be necessary.

Section 4

As the Boulder-to-Bullfrog road enters Glen Canyon National Receation Area, a short section of roadway about 1 mile from the boundary would require heavy construction to alleviate excessive grade (over 10%) and upgrade a sharp curve. Light construction then would apply up to Bullfrog Creek, where a bridge is proposed.

About 1 mile beyond Bullfrog Creek a curve realignment would require medium construction for about 1,000 feet. Beyond that, to the junction with Highway 276, light construction would be appropriate.

The FHWA report does not identify the location of the batch plant for preparation of the hot mix. See the Appendix for typical roadway sections as visualized by FHWA engineers. The FHWA report included a preliminary investigation of potential sources of aggregate. One is near the town of Boulder, about 1 mile west of the road. Another is Sand Creek Pit, close to the Notum Road. Eggnog is also identified as a source under Alternative # I-a. Gravel terraces in the Bullfrog Creek drainage within Glen Canyon National Recreation Area are included. Materials available at the select borrow source in Horse Canyon are not considered by the FHWA to be suitable for pavement or base coarse aggregate.

Although the FHWA report did not discuss the locations of batch plants or construction camps, the needs of the contractor would presumably be considered, as discussed in Alternative I-a, and appropriate clearances obtained before construction.

Alternative II - Gravel entire route

This alternative would incorporate the construction (except paving) outlined in Alternative I-b (Pave Entire Route). There would be no changes in the numbers of bridges, culverts, etc.

Refer to Alternative I-a for a basic description of the roadway and to the Appendix for engineering definitions and design specifics.

Alternative III - Limited Improvement

The concept is for a low speed (20 to 35 miles per hour in most sections) unpaved scenic road to provide safe passage between Boulder and Bullfrog about 90 percent of the time. With one exception, it would not depart from the existing roadway. See Alternative I-a for a basic description of the roadway.

Section 1 - The roadway from the town of Boulder to the west boundary of Capitol Reef National Park

This approximately 30-mile stretch of road is crossed by several drainages. One, the Horse Canyon East crossing, is presently served by a wooden bridge that would be retained and reinforced. The other major crossings--Deer Creek, The Gulch, and Horse Canyon--would be provided with paved dips; if the substrate is unsuitable for paved dips, then appropriate culverts would be installed.

Earthwork will be confined to the existing roadway in this section. At the approaches to the paved dips, importation of materials will be necessary to provide an adequate grade. In some areas, especially between Long Canyon and the park, clay soils are present. These portions of the road are unstable, and would require import of granular material to improve the road subgrade; this would be topped with gravel.

Section 2 - The roadway within Capitol Reef National Park

This approximately 9-mile length of roadway winds through a portion of the Waterpocket Fold, and presents some of the more difficult challenges for road improvement. Some gravelling (as described in the Section 1 discussion) would be necessary for parts of the road between the western boundary and the Muley Twist Wash. No deviation from the existing roadway would be allowed.

The Muley Twist Wash roadway would also be followed, and would be unaltered, except for a paved dip at a point where the wash crosses the roadway.

The existing roadbed at the switchbacks would be adhered to, except for cutting and filling in the course of routine and emergency maintenance. Existing drainage and safety devices would be examined to determine if improvements could be made without altering the existing grade and alignment.

At the Halls Creek Crossing, either a paved dip or culvert would be installed. Some importation of materials may be necessary to improve the grade at the approaches.

Between The Post and the eastern park boundary is a ±6,000-foot length of roadway that would be relocated to the left no further than 500 feet from the existing roadway alignment. This would take the road out of a wash bottom and eliminate multiple wash crossings. The length of the roadway would be constructed to a 26-foot width standard, with a dirt

surface and adequate provision for drainage. This would be the only departure from the existing alignment incorporated in this alternative.

Section 3 - The roadway from the east boundary of Capitol Reef National Park to the west boundary of Glen Canyon National Recreation Area

There are some minor wash crossings on this 19-mile stretch of road. About 11 miles have been graded and drainage structures installed. In a few locations new or replacement culverts or paved dips may be required. One or two locations may require importation of granular materials for the subgrade and subsequent addition of gravel.

In this section the road would not be widened or any other departure made from the existing alignment.

Section 4 - The roadway within Glen Canyon National Recreation Area

For this alternative, there would be no construction in this section outside the present roadway. A 30-foot-wide bridge crossing at Bullfrog Creek would be required to provide for dependable access when Lake Powell is full. Earthworks at the approaches to the bridge would be required to provide proper alignment of the road.

About 2½ miles from the junction with Route 276 is a large culvert that provides drainage for a fill area crossed by the road. Some work would be required here to control existing problems of erosion.

Alternative IV - No action

Refer to Alternative I-a for a basic description of the roadway.

The Boulder-to-Bullfrog road is, as it exists today, a low-speed dirt-and-gravel thoroughfare that is passable by most two-wheel-drive vehicles during periods of good weather. Periods of wet weather, however, often cause washouts at stream crossings and create slippery conditions where the road traverses clay beds. When this occurs, only four-wheel-drive vehicles can be used over the road; flooding at certain areas (e.g., The Gulch and Bullfrog Creek) can be extensive enough to preclude all vehicular traffic.

Garfield County now maintains the Boulder-to-Bullfrog road. Should the No Action alternative be adopted, this level of county support would likely continue.

In contrast to the other Alternatives which would likely result in increased use, the No Action alternative would result in an increase or decrease depending on several outside variables, including:

1. Developments associated with the Southeastern Utah area. These can include: industry, mining, recreational developments, and improvements made on other roads.

2. Level of routine and emergency maintenance on the road.

3. Changes in visitor use patterns because of economic conditions or any other factors.

AFFECTED ENVIRONMENT

NATURAL ENVIRONMENT

Geology, Soil, and Water

The setting of the Boulder-to-Bullfrog road--deep canyons, low plateaus, domes, mesas, and the Waterpocket Fold--broken by faulting and carved by tributaries of the Colorado River--is undoubtedly one of the most spectacular in the country. The geology of the area has been relatively well studied, primarily because of the presence in the region of uranium and other mineral deposits of commercial interest.

Exposures of rock formations range from Permian (about 250 million years old) to Cretaceous (about 70 million years old), and there are younger (Quarternary) sedimentary deposits.

Rock Formations Crossed by the Boulder-to-Bullfrog Road

Quaternary	-	Various alluvial deposits
Cretaceous	-	Mancos Shale Dakota Sandstone
Jurassic	-	Morrison Formation Summerville Formation Entrada Sandstone Carmel Formation
Triassic/Jurassic	-	Navajo Sandstone
Triassic	-	Kayenta Sandstone Wingate Sandstone Chinle Formation Moenkopi Formation
Permian	-	Kaibab Limestone

Source: Geology of the Capitol Reef Area; and others.

Predominant soils consist of coarse-grained, wind- and water-developed material derived largely from sandstone. The soils are highly unstable and susceptible to wind and water erosion. Cryptogamic earth is found in some areas of the roadway, notably at Muley Twist. The surface forms a delicate crust composed of nitrogen-fixing bacteria and algae. If this crust is disturbed, erosion and depletion of soil nutrients will follow.

Many sections of the Boulder-to-Bullfrog road are built over clay soils with unstable characteristics. This is especially true of the area between Muely Twist Canyon and Long Canyon. In the drainages, the road crosses unconsolidated alluvium, with varying amounts of gravel incorporated. Sandy loams are sometimes found from the base of the Burr Trail switchbacks to the boundary of Glen Canyon National Recreation Area.

Two geological resources of special concern in road construction are gravel and water. Perhaps the best gravel deposits near the roadway are those located along Bullfrog Creek (identified as a source in both subalternatives of Alternative 1). According to a recent opinion of a Department of the Interior Solicitor, these deposits may only be used in NPS areas, and then only if the following criteria are met: 1. It is totally impractical to import gravel, 2. The gravel site is devoid of cultural resources, and 3. The area has a low natural resource value.

Water for compaction of materials and for dust control may be obtained at Boulder and at Bullfrog, and in various of the drainages crossed by the road (notably Deer Creek and The Gulch). Existing water rights on BLM lands, including those held by private interests, could affect the availability of water in the area. The Waterpocket Fold region lacks readily-available water. However, Capitol Reef National Park's General Management Plan provides for a well at the base of the fold for a proposed development; that aquifer could be tapped for the proposed road improvement.

No earthquakes of a magnitude greater than 4.3 on the Richter Scale were recorded in Garfield County between 1853 and 1978 (latest records available), and frequency is relatively low.

Climate

The area of Garfield County traversed by the Boulder-Bullfrog road is in the Desert Climatic Zone as defined in the Modified Koppin Classification (based on the response of vegetation to temperature and precipitation factors). This zone has been characterized as "areas where the average annual precipitation is less than one-half of the annual potential evapotranspiration. In these areas total annual precipitation is usually about five to eight inches" (Atlas of Utah).

Based on rain records from several stations in the region, August is the wettest month of the year and February is the driest. Winter snows average about 15 inches, with much variation from year-to-year. Sporadic heavy rains in the summertime often result in flashflooding and consequent washouts on the Boulder-Bullfrog road. (Source: park files)

Precipitation at Burr Trail Station, Capitol Reef National Park

	1982	1983	1984
January	not available	1.24	.70
February	not available	.80	.25
March	.50	2.32	.06
April	.32	.34	.76
May	.40	.45	.00
June	.30	.22	.59
July	.05	.58	1.32
August	2.55	.96	1.76
September	.45	.24	.40
October	.35	2.01	1.35
November	.96	.64	.05
December	1.96	1.14	1.99
Total	7.84"	10.94"	9.23"

Note: Not recorded daily.

Source: Park files.

High evapotranspiration rates contribute to the aridity of the region, and extreme temperatures (below 0°F and above 100°F) occur in the appropriate season. The annual mean temperature along the Boulder-Bullfrog road ranges between 50° and 55°F. January tends to be the coldest month, and July the hottest. (Source: park files)

Flora and Habitat Types

Plant species in riparian habitats are dependent on the water tables in drainages. Although there is some variation between the drainages along the Boulder-to-Bullfrog road, some species are more frequently encountered. These incude tamarisk, willow, and cottonwood.

Plant species encountered in desert habitats are unable to tap the water table, and high evapotranspiration rates preclude dense vegetation of any type. Along the Boulder-to-Bullfrog road, two primary types of desert communities are found--xeric shrub and pinyon/juniper.

Common plants of xeric shrub regions (primarily the flatter, lower areas along the road) include blackbrush, saltbrush, prickly-pear cactus, snakeweed, Mormon tea, greasewood, and sagebrush. Xeric shrub tends to grade into the pinyon/juniper community as higher elevations occur. This community is also found on north facing slopes and in the bottoms of washes. Other common species in the pinyon/juniper habitat type include sagebrush and rabbitbrush. (NPS and BLM files)

Fauna

The Boulder-to-Bullfrog road lies within the Kaiparowits subcenter of the Colorado Plateau Faunal Area. The subcenter ". . . is characterized by mammals found primarily in Arizona whose range extends into and often through this area." (Atlas of Utah)

Large mammals found in Garfield County include mule deer, bighorn sheep, bison, and elk. Prior to the mid-nineteenth century bison and bighorn sheep ranged widely in southern Utah. Restocking in the Henry Mountain area of both species has been successful, and they occur occasionally in the region east of the Waterpocket Fold. Mule deer may be found in many areas along the Boulder-to-Bullfrog road. Although there is elk winter range in BLM's Escalante Resource Area, elk are not known in the areas adjacent to the Boulder-to-Bullfrog road. The potential exists, however, for stray individuals from the Steep Creek area to wander to the roadway. A hunt is established now for bull elk in the area. Likewise, pronghorn antelope occur in Wayne County to the north, where they were introduced, but they apparently do not range as far south as Garfield County.

Carnivores include ring-tailed cats, badgers, fox, coyotes, bobcats, and mountain lions. A variety of small mammals occur at various locations along the Boulder-to-Bullfrog road, including rabbits, porcupines, woodrats, kangaroo rats, mice, beaver (e.g., in Hall's Creek), gophers, squirrels, skunks, and bats.

Some of the larger bird species that may be seen from the Boulder-to-Bullfrog road are red-tailed hawks, golden eagles, and Cooper's hawk. Peregrine falcons (one pair) nest in the Long Canyon area. Some other more commonly observed species include American kestrels, mourning doves, various swallows, scrub jays, ravens, rock wrens, and various warblers and sparrows.

Several species of lizard, a few snakes, and several frogs and toads complete the list of vertebrate fauna along the Boulder-to-Bullfrog road. Notable species include the spadefoot toad, Woodhouse's toad, the red-spotted toad, leopard frogs, collared lizards, spring lizards, and fence lizards.

In the various drainages crossed by the Boulder-to-Bullfrog road are several species of fish. The species most likely to be encountered are speckled dace, black bullheads, and bluegills. Also in these waters is the typical range of aquatic invertebrates such as snails and insect larva. The terrestrial invertebrate fauna has not been extensively studied, but includes examples of most of the major insect orders.

Endangered Species

The U.S. Fish and Wildlife Service (FWS) Endangered Species Office in Salt Lake City has identified several species of concern that may occur in the area of the Boulder-to-Bullfrog road. They are:

Listed
Peregrine falcon (Falco peregrinus)
Bald eagle (Haliaeetus leucocephalus)
Colorado squawfish (Ptychocheilus lucius)
Bonytail chub (Gila elegans)

Proposed
Jones cycladenia (Cycladenia humilis var. jonesii)

The BLM and the NPS have initiated separate studies to determine if the proposed road paving is likely to affect any listed species or crucial habitat. These studies will also determine if the proposed action is likely to jeopardize the continued existance of proposed species or result in the destruction or an adverse modification of any critical habitat proposed for such species. If the determination is "may effect" for any listed species, the agencies will request formal Section 7 consultation with the FWS. No irreversible or irretrievable commitment of resources related to the proposed paving will be accomplished until the Section 7 Endangered Species Act consultation process is complete.

Specific concerns the FWS has about the proposed project on which BLM and NPS will report include:

1) Essential habitat for wintering bald eagles could exist on or near the proposed road construction. Essential habitat is defined as those locations used annually by 15 or more eagles for two weeks or longer. If so, the project could have an effect on the population.

2) An active peregrine falcon eyrie is located in the Long Canyon area, and there could be other peregrine falcon sites near the project area. Effects of the proposed road construction and (potentially) increased traffic on this species require determination.

3) If water for road construction was taken from the Colorado River drainage, there could be an effect on the Colorado River fishes.

4) A population of the plant species Jones cycladenia, whch is proposed for inclusion as a threatened and endangered species, exists to the west of the project near Purple Hills. There could be populations of this species near the project area.

Some preliminary reports from the field are available. As of December 1984, there were no known sightings of threatened or endangered wildlife or plant species on BLM lands adjacent to that portion of the Boulder-to-Bullfrog road that lies between the Capitol Reef National Park and the junction with Highway 276. One exception are wintering golden eagles sometimes noted in the surrounding area, searching for prey.

Between Capitol Reef National Park and the town of Boulder is Long Canyon, where the peregrine falcon eyrie (noted in no. 2 above) is situated approximately 1/4 mile from the roadway. No other threatened or endangered animal species other than the two raptors mentioned appear to have the potential of being affected by the proposed Boulder-to-Bullfrog paving.

There are several rare plant species that occur in the general study area. Garfield County has been described as having ". . . the highest potential for rare and endangered plants in the state, next to Washington County" (Ecological Reconnaissance: Halls Creek). The previously mentioned Jones cycladenia has been found within 15 miles of the Boulder-to-Bullfrog road. BLM biologists have also identified the rare Wright fishhook cactus as having ". . . potential for encountering . . ." (BLM files) in the area. NPS files indicate that there is potential for finding the Harrison milkvetch (an endangered species) near the roadway.

Air Quality

A program mandated by the Clean Air Act is prevention of significant air quality deterioration. There is provision for three levels (Classes) of quality; each differs in the amount of deterioration permitted. The lands crossed by the Boulder-to-Bullfrog road are all Class II areas except for Capitol Reef National Park, which is Class I (the most restrictive class in terms of allowable levels of deterioration).

Data on the existing air quality of this region are very limited. However, the levels of particulate matter appear to be sufficiently low that the maximum allowable concentrations of this and other pollutants do not threaten to exceed Class I and Class II threshholds. The primary existing threats to air quality are vehicle emissions and fugitive dust.

CULTURAL RESOURCES

The earliest documented occupants in the region were of the Colorado Plateau, or Desert Archaic Culture (about 8,500 to 2,500 years ago). They depended primarily on hunting and collecting plants for food. Then, about 1,500 years ago, corn was introduced, and the bow-and-arrow, pottery, and other indicators of a more advanced culture became evident in the area.

The two cultural groups in southrn Utah representative of this new stage were the Fremont and the Anasazi. The Fremont left most of the cultural evidence of pre-European settlement in the region between Boulder and the Bullfrog Basin. The Fremont Culture centered around agriculture and gathering of wild plants, and there still exist structures (particularly grainaries), stone tools, and rock art made by Fremont Indians.

The Anasazi are not traditionally associated with the Boulder-to-Bullfrog area. The culture reached its peak about 700 to 800 years ago with the well-described cliff dwellings, none of which were known in the project area east of Boulder until very recently; a 60-room ruin was discovered a few years ago in the Circle Cliffs area.

Most recently, Paiute Indians, a Shoshonean group, lived in the region. There culture was centered around hunting game and gathering plant foods, and it was the Paiutes who met the first Mormon settlers in Garfield County. This varied and somewhat complex series of prehistoric occupations of the Waterpocket Fold area presents problems for those seeking to understand existing sites. As one archeologist says (Revitte 1985), "In this region of three cultures, it is sometimes difficult to define which sites belong to which culture." Many of the recorded sites cannot be assigned to one specific group.

Certain portions of the Burr Trail itself, particularly on the west side of the Waterpocket Fold, constitute a route utilized during prehistoric times as well as by the earliest European explorers, settlers, and miners. The switchbacks down the east face of the Waterpocket Fold, and the road to the east, were built in fairly recent times.

A preliminary examination of the Boulder-to-Bullfrog road was made by BLM archeologists for this Environmental Assessment. For the Henry Mountain Resource Area (BLM), Glen Canyon National Recreation Area (NPS), and Capitol Reef National Park (NPS), the examination consisted of verifying recorded site locations on or near the roadway. As little information exists for the roadway through the Escalante Resource Area, a BLM team began an examination of that section in December, 1984. Snowfall precluded completion of the survey, but several sites were recorded within or near the roadway of the proposed realignment at The Gulch and elsewhere along the roadway.

Sites represented along the Boulder-to-Bullfrog road include habitation sites (rock shelters), campsites, aboriginal stone tool quarries, lithic scatters, and rock art. The campsites (temporary and long-term) may be found anywhere, but are expecially common in sandy areas and in

pinyon-juniper stands. Quarry sites are found wherever chart and chalcedony nodules occur. Chipping sites are prevalent throughout the region.

LAND USE

The existing use of the Boulder-to-Bullfrog road is primarily of two types: recreational and administrative. The road (or parts of it) are used by persons who wish access to backcountry areas in the Circle Cliffs and Waterpocket Fold regions, as a convenient means of viewing the countryside, and as a means of getting to and from the Notom road and more westerly locations in Garfield County such as Escalante and Boulder. These may be considered recreational uses.

Federal, state, and Garfield County officials use the road for various management needs. These may relate directly to land use management (e.g., BLM's grazing permit monitoring activities and NPS's recreational use monitoring), or indirectly as the most convenient means of transportation between two points (e.g., Garfield County's responsibilities in the Bullfrog-Ticaboo area).

Federal Land Use Management

The BLM is governed by a legislative requirement that the public lands be managed for multiple uses; lands and resources generally are not managed for a single use but for several complementary uses. The relative importance of each use activity depends primarily upon the capabilities of the land and on public demand. The BLM concept of multiple use provides for both the use and the protection of public land resources. In the Escalante Resource Area and the Henry Mountains Resource Area, existing uses include livestock grazing, recreation, hunting, wildlife habitat, mineral activities, and management of wilderness study areas.

The NPS is governed by legislative mandates that require conservation of natural resources for the use and enjoyment of the public, and this basic management goal applies to all units of the National Park System. The enabling legislation for Glen Canyon National Recreation Area also provides for grazing and for mineral leasing insofar as these uses are compatible with basic conservation and public recreation purposes. Likewise, legislation for Capitol Reef National Park provides for retention of existing grazing rights within the park, with an administratively-determined phase-out schedule.

State Land Use Management

The State Land Board manages state school sections within BLM and NPS boundaries. The state grants grazing and mineral leases, and other commercial activities on these sections.

Local

Garfield County officials manage county interests (it owns no land along the Boulder-to-Bullfrog road) based on perception of likely benefits to

the residents of the county. The 1984 updated Garfield County Master Plan, prepared by the Five County Association of Governments, is the basic reference for planners and others interested in economic growth and other benefits to residents.

RECREATION AND WILDERNESS VALUES

The National Park Service and the Bureau of Land Management have quite similar approaches to public uses of areas along the Boulder-to-Bullfrog road. The road furnishes backcountry users with a means of access to the spectacular canyon country of the Waterpocket Fold, and the Circle Cliffs area. There are fine views along the road for those visitors who do not wish to venture into the surrounding countryside. Impacts of paving the road on recreational use patterns will be considered.

The extensive development at Bullfrog attracts persons (241,000 in 1984) interested in the more active watersports-oriented environment that Lake Powell provides. Paving the Boulder-to-Bullfrog road may affect the amount of use of the facilities and services provided at Bullfrog.

Agency concerns about wilderness are largely governed by legislative and policy constraints, but both the BLM and the NPS operate under agency management guidelines.

The descriptions that follow of the two study areas managed by BLM are extracted from "Introducing the Utah State Wilderness" EIS prepared by BLM.

North Escalante Canyon/The Gulch ISA

The ISA is located in Garfield County, approximately 5 miles east of the Town of Escalante, Utah. The ISA contains 119,273 acres of BLM-administered land which includes the North Escalante Canyons Outstanding Natural Area (5,800 acres), Escalante Canyon Outstanding Natural Area (840 acres), The Gulch Outstanding Natural Area (3,430 acres), and portions of Deer Creek Recreation Area (475 acres), Calf Creek Recreation Area (425 acres), and Phipps-Death Hollow Outstanding Natural Area (12 acres).

The majority of the ISA characterized by steep-walled canyons, mesas, plateaus, and natural arches. The Escalante River and Harris Wash flow through the ISA. Much of the ISA is bare rock outcrop; pinyon-juniper is the major vegetation type.

Steep Creek WSA

The WSA is located approximately 3 miles east of Boulder, Utah, and borders the Dixie National Forest on the north and the Burr Trail on the south. The WSA is characterized by a series of long, deep canyons separated by benches. The major vegetation type is pinyon-juniper. There are approximately 5,000 acres of elk winter range in the WSA.

Opportunities for both solitude and recreation are excellent throughout most of the WSA. The opportunities for solitude are related to the numerous winding canyon drainages with their riparian

vegetation and the steep cliffs, which isolate benchlands between drainages. There are outstanding opportunities for backpacking, hiking, horseback riding, photography, sightseeing, and rockhounding. The quality of naturalness is high, and there are few minor intrusions. Approximately 3,800 acres do not meet wilderness criteria.

The geological features, which provide scenic values, are a special feature of the WSA.

Possible resource conflicts include uranium exploration and/or development (northeast portion of WSA) and rights-of-way (southern portion of the WSA.)

The proposed wilderness for Capitol Reef National Park includes 11 geographical units, of which units 2 and 3 have boundaries near the Burr Trail (Boulder-to-Bullfrog road). The descriptions of these units that follow is extracted from "Revised Wilderness Recommendation: Capitol Reef National Park - a 1983 report by the NPS.

> Wilderness unit 2 (Wagon Box Mesa) encompasses 29,280 acres and includes a portion of Halls Creek, plus Red Slide, Muley Tanks, Brimhall's Double Arch, much of Muley Twist Canyon, Wagon Box Mesa, and Grand Gulch. This unit is about 12 miles long, with a width varying from 2½ to 6½ miles. It is bounded on the north by Burr Trail and another graded road that parallels Halls Creek by the Post; on the east, and most of the west by the park boundary; and on the south by a State section and the park boundary. Potential wilderness additions of 950 acres consist of an oil and gas lease area, the Rainy Day Mines and access road, and a livestock corral and road access near the Post.
>
> This unit is the most outstanding of all for wilderness designation, and also the one most fragile and susceptible to damage by outside influences because of its narrowness.
>
> Wilderness unit 3 (Red Canyon) includes 27,260 acres; it is bordered by the Burr Trail on the south, a road along most of the eastern and northern sides, and the park boundary on the west. It is almost 18 miles from north to south, and varies from 1.7 to 4 miles in width. Potential wilderness additions of 85 acres consist of a primitive road in Muley Twist Canyon and a stock tank on Cedar Mesa.

SOCIOECONOMIC ENVIRONMENT

Because of the complexity of the socioeconomic issues relating to this project, the Utah Office of State Planning and Budget was contracted to accomplish a socioeconomic study of the proposal to pave the Boulder-to-Bullfrog road. The study document is available for examination from the National Park Service. Following is a summary of information from the study.

At this time, traffic over the Boulder-to-Bullfrog road averages 10 vehicles per day. Should the road not be paved, negligible increases in use are projected (perhaps one vehicle per day per year increase, based on overall Utah State projections of 6 percent annual increases on all roads). Without paving, projected income and population figures are based on existing levels of roadway maintenance.

Total monthly personal income is projected to be $2.65 million in Garfield County in 1988, increasing to $3.47 million in the year 2000. For Kane County the figures are $2.37 million and $3.54 million for the years 1988 and 2000 respectively.

In Garfield County, the population of the community of Escalante is projected to be 723 in 1988, increasing to 753 by 2000. In the town of Boulder, 1988 and 2000 population projections are 122 and 127 respectively. In Kane County, the unincorporated area of Bullfrog is projected to have an increase of 19 between 1988 and 2000, increasing from 96 to 115 persons. However, it should be realized that residents of Bullfrog are employees of the National Park Service and the area's concessioner. The National Park Service controls the number of its employees in the area as well as the availability of housing for all residents.

ENVIRONMENTAL CONSEQUENCES

ALTERNATIVE I - PAVE ENTIRE ROUTE

This alternative is divided into two subalternatives (see description of alternatives). Environmental impacts of the subalternatives are essentially the same, and so will be analysed as one. Certain specific exceptions are, however, mentioned in the discussion that follows.

Natural Environment

Geology, Soil, and Water Environmental Impacts.

Widening and paving of the Boulder-to-Bullfrog road and other construction activity (e.g. realignments, placement of fill, extraction of materials from borrow areas, and use of water resources) would disturb fragile soils. Erosions of soils in these disturbed areas would occur. Backcountry soil erosion caused by increased ORV use could result because of the improved access afforded by an improved roadway. Widening and realignment in the Muley Twist Wash would destroy some areas of cryptogamic earth. Sedimentation would occur in the drainages crossed by the road. Use of materials from borrow areas could lead to unnatural patterns of drainages in the impacted areas, and could increase the amount of sediment discharge into adjacent streams.

Mitigation Measures

Methods such as reseeding, proper grading, and installation of appropriate surface water runoff devices would reduce soil erosion problems caused by construction along the roadways. Special care could be given to avoid areas where cryptogamic earth is found. Water could be drawn from drainages during periods when stream flow is in excess of that amount needed to maintain natural water table levels. Sorting of materials in borrow areas could be done so that wasted fines are prevented from entering streams. During construction, the road could be watered to reduce the quantities of dust.

Flora and Habitat Types: Environmental Impacts.

Removal of approximately 600 acres of roadside vegetation would occur during road construction (widening, cutting and filling, realignments). Extraction of water from the drainages for compaction of materials and for dust control could have adverse effects on riparian vegetation.

Migitation Measures.

Consideration could be given when altering the roadway alignment to avoid specimen trees, areas with cryptogamic earth, and other areas of concern. Revegetation of fill areas with appropriate native species (or exotics, on BLM lands) could be undertaken.

Fauna:
Environmental Impacts.

Removal of soil and flora as discussed above would cause localized disturbance and possible displacement of certain small vertebrate species, and invertebrates. Road kills would increase. The potential exists for disturbing bird nesting due to possible increased traffic noise. Stream fauna could be adversely affected by increased sediment load.

Mitigation Measures.

Appropriate signing could reduce road kills by making the travelling public more aware of animal life near the road.

Endangered Species:
Environmental Impacts.

Potential impacts of this alternative on Threatened or Endangered (T&E) species fall into two categories - elimination of individual organisms and populations, and causing the displacement of individuals and populations. As there is no designated critical habitat for any T&E species along the roadway, it is unlikely that there would be any displacement or destruction of any sizable populations.

Responses from field areas to the four concerns expressed by the U.S. Fish and Wildlife Service on T&E species (under "Affected Environment") are incorporated here intact (BLM and NPS files).

Responses from the Cedar City District Office, BLM:

1. The only essential habitat for wintering bald eagles near the project area occurs on Lake Powell within the Glen Canyon National Recreation Area. It is unlikely that this project would have any effect on those birds.

2. The Long Canyon eyrie is the only known peregrine nest site along this road. Effects of road construction and increased traffic on this nest site are unknown, but are likely to be similar to those analyzed for the Circle Cliffs Tar Sands EIS.

3. It is unknown how much water would be required for construction and what the source would be.

4. The Purple Hills and Deer Point are the only known populations of Jones cylandenia in the project area and will not be affected by this project.

Responses from Glen Canyon National Recreation Area, National Park Service:

1. Based on recent wintering bald eagle habitat census it has been determined that the Halls Creek area supports a small wintering population. The road upgrade project, will not, in our opinion, affect this population.

2. Peregrine falcon sightings are common in the Bullfrog Basin. It is anticipated, based on the frequency of sightings, that an eyrie occurs in the Bullfrog vicinity. The location of this eyrie has yet to be identified; however, typical habitat is lacking along the lower portions of the road corridor. Based on the lack of potential habitat and the fact that the road presently exists, the project is not anticipated even at a higher level of use, to have any effect on the peregrine falcon.

   A peregrine falcon eyrie is located in Long Canyon within 1/4 mile of the road. It is possible that construction involved with the upgrading of this road and increased traffic after upgrading could adversely affect this eyrie during a portion of the year.

   The crucial period of the year for peregrine falcons is the nesting season (mid-March through June), with the egg-laying and incubation period (mid-March through June) being the most critical time. Nest disturbances during the egg laying/incubation period may cause the adults to abandon their nest.

   The most significant impact to pergrines would be from increased noise from vehicles and machinery in Long Canyon. Whether or not the increased noise levels would disturb this pair of falcons depends largely on the disposition of the birds, particularly the female. Some peregrines nest successfully on city buildings and seem not to be affected by traffic or other city noises. Other peregrines abandon their nests at the slightest disturbance. It is unknown how the Long Canyon pair will react. However, the probability of disturance is likely to increase as traffic increases.

   The most critical time for disturbance would be from mid-March during the egg-laying and incubation period. The change of nest abandonment would decline after the young have hatched and would continue to decline until the young have fledged. Traffic should have little effect on peregrines after the nesting period.

3. The water use requirements for road construction are not available to park staff at this time; however, from the endangered species perspective water use will have no effect on the Colorado River squawfish and the bonytail chub. Both species require river habitat which is lacking in the project area.

4. Due to the distance from the road, the overall impact of this proposal on Jones cycladenia should not result in the escalation of these activities to the extent that the species would be further jeopardized.

Mitigation Measures.

Until such time as the Section 7 consultation process is completed, no construction work or other potentially adverse actions will be implemented on the Boulder-to-Bullfrog road. If no adverse effects are identified and the proposed road paving proceeds, agencies would carefully monitor the work to ensure continued compliance with the Endangered Species Act.

Construction in Long Canyon would be restricted during the peregrine nesting and egg incubation period.

Air Quality:
Environmental Impacts.

With Alternative I, paving the road would eliminate the dusty conditions now experienced by drivers. Should the Boulder-to-Bullfrog road be paved, the most significant impact on air quality would likely be an increase in vehicle emissions. At the projected level of 250 vehicles per day, it would not constitute a threat to the air quality of any of the areas along the roadway, including Capitol Reef National Park, a Class I area under the Clean Air Act.

Fugitive dust would create short-term impacts on air quality during the construction phase.

Mitigation Measures.

During construction, the roadway would be treated with water to assist in compaction and to reduce the amount of fugitive dust produced.

Cultural Resources

Environmental Impacts

Impacts of paving the Boulder-to-Bullfrog road to cultural resources relate primarily to the approximately 30 archeological sites near or adjacent to the roadway, the proposed realignments, and to the proposed borrow areas. Impacts can be direct (damage caused by road construction activities) or indirect (damage caused by an increase in human activities near the roadway). It is likely that the proposed realignments would directly impact about 10 sites.

Mitigation Measures

Before realignment or other alterations of the existing roadway can take place, the roadway and quarry sites must be evaluated for their National Register and interpretive significance. Alternative I-b differs from Alternative I-a in that the former proposes a minor realignment near the Halls Creek Crossing in Capitol Reef National Park to avoid an Archaic pictograph.

The preliminary examination of the proposed gravel pit along Bullfrog Creek (Glen Canyon National Recreation Area) did not yield any cultural resources. Should a full-scale archeological survey be completed and some level of construction be anticipated, standard stipulations would be applied to the contracts. A sample of stipulations used by the NPS and the BLM includes:

A. All vehicular traffic and personnel will be confined to existing roads and surveyed areas.

B. Personnel will refrain from collecting artifacts and otherwise disturbing cultural resources in the vicinity.

C. Should subsurface cultural resources be discovered during construction, construction will cease and the District Manager (BLM) or the Park Superintendent (NPS) notified immediately. The cultural resources will expeditiously be evaluated and mitigation measures, commensurate with the site's value and impact, instituted.

D. Should it be necessary to deviate from the defined right-of-way, a cultural resource investigation will be conducted prior to disturbance.

Land Use

Environmental Impacts

The proposal to pave the Boulder-to-Bullfrog road relates primarily to a hoped-for increase in tourism in Garfield County and surrounding areas. Should the road be paved, there is potential for demand for other activities relating to land use. These include mineral extraction and hauling (e.g., tar sand resources), pressures to improve backcountry roads feeding the Boulder-to-Bullfrog road, use of the roadway as a utility corridor (e.g., electrical power lines), and questions relating to the commercial leasing of state school sections on or near the road.

Mitigation Measures

Should the road be paved, agencies involved with use of the road (BLM, NPS, state of Utah, Garfield County) could develop management policies relating to land use along the roadway. The Federal agencies would be guided by the laws and regulations under which they now operate. Major road alterations involving substantial new construction and/or extensive realignment would not be allowed without formal prior approval on a case-by-case basis.

This assessment assumes that Garfield County or the state of Utah would maintain the road once it is constructed. Agreements would be drawn up between the county and the Federal land-managing agencies involved to assure that the maintenance properly protects Federal lands. The agreements would specify that th maintenance would include the pavement, shoulders, ditches, and adjacent disturbed slopes.

Recreation and Wilderness Values

Environmental Impacts

The relationship of proposed wilderness areas near the Boulder-to-Bullfrog road to eventual paving of the road has been discussed.

Projected traffic over the Boulder-to-Bullfrog road (the Creamer and Noble Report estimates 250 vehicles/day) should it be paved could lead both BLM and NPS to construct additional recreation support facilities (e.g., campgrounds, picnic facilities, and restrooms) adjacent to the road but not in the proposed wilderness areas. This would be especially true at Deer Creek, The Gulch, Calf Creek, and the area east of the Burr Trail switchbacks. There would be visual impacts due to these facilities, as well as the paving of the road, road realignment, bridge abutments, traffic safety barriers, and similar facilities.

If Congress designates wilderness areas on lands administered by BLM, that agency would prepare Wilderness Management Plans to govern use and protection of the areas. As part of the plans, it is assumed that a maintenance-and-use border would be allowed along roads that are adjacent to or "cherry-stemmed" into the wilderness areas for purposes of road maintenance, temporary vehicle pull-offs, and trailhead parking. These borders would be up to 100 feet from the edge of the road travel surface. As an equivalent border now exists through the recommended wilderness in Capitol Reef National Park, no legislative or policy changes would be required for that area should the road be paved.

Mitigation Measures

Agencies would respond to the recreational need of possible increased visitor traffic, and the BLM is bound by law and agency policy relating to the two study areas in the Escalante Resource Area. Facilities would be designed so as to blend into the landscape to the greatest degree possible. Color would be added to concrete to provide a more natural appearance (e.g., on the switchback barriers and bridges).

Upgrading the existing road (including minor realignments) where it passes through Long Canyon would be physically constrained by the severe topography and sheer canyon walls to such an extent that wilderness values of the North Escalante Canyon/The Gulch ISA and the Steep Creek WSA would not be affected.

Socioeconomic

Environmental Impacts

The following is extracted from the contracted socioeconomic study referred to under "Affected Environment." The analysis assumes that paving the Boulder-to-Bullfrog road would result in construction of a visitor service and complex east of the switchbacks in Capitol Reef National Park as proposed in the park's General Management Plan.

Several other assumptions were used in this analysis. The analysis assumes that the manpower requirements of construction of the road as stated in the Cramer and Noble report are accurate estimates. The analysis further assumes that Creamer and Noble's projected increase in traffic on the Boulder-to-Bullfrog road as a result of improvement is an accurate reflection of its use by new travelers. These traffic projections were used in the calculation of increased service needs in Capitol Reef National Park, and increased services and recreation direct employment due to the additional tourist travel on the improved road. Since Garfield and Kane Counties constitute the areas primarily affected by the economic changes the data presented in this section will include only these two counties and cities and towns within their borders.

Construction of the road, and new facilities at Capitol Reef National Park associated with the road, would result in a population impact of 244 in the peak year of construction (1988) in Garfield County, and then decline when construction is completed. The population impact of 24 by the year 2000 reflects the need to accommodate projected increase in tourist traffic associated with the improved Boulder-to-Bullfrog road.

The construction impacts would be insignificant in Kane County, with a projected population impact of 4 in 1988. After construction, however, Kane County would have the majority of population impact, in order to service the tourist traffic and related industries. The population impact is projected to be 115 by the year 2000, or an increase to Kane County's baseline population of 2 percent.

The number of households are projected to increase in Garfield County by 62 at the peak of construction in 1988. The total household increase in Garfield County above baseline by the year 2000 is projected to be 7. The households impact in Kane County is similar to its population impacts, with 1 new household projected for 1988 and an additional 32 by the year 2000.

Of the two major age groups of interest, increases of those over 65 would have no significant impact in either Garfield or Kane County. The school-age population, however, would be impacted. The school-age population is projected to increase by 49 in Garfield County during the peak year of construction. After the construction projects are completed the school-age population impact would be insignificant in Garfield County. Kane County is projected to have an increasing impact in the school-age group, with only 1 in 1988, and an increase of 34 children by the year 2000.

SUMMARY OF EXISTING AND PROJECTED POPULATION AND EMPLOYMENT LEVELS*

County	Population	Households	School Age Population	65 Years and Over Population	Total Employment
Garfield					
1985	4050	1360	940	470	1680
1988	4080	1350	980	450	1680
1990	4100	1370	1070	450	1680
1995	4200	1410	1140	430	1720
2000	4250	1420	1190	390	1770
Kane					
1985	4400	1340	1270	440	1440
1988	4600	1400	1330	450	1480
1990	4700	1430	1350	470	1510
1995	5200	1540	1540	480	1640
2000	5500	1700	1690	460	1780

*Based on continuation of present levels of repair and maintenance on the Boulder-to-Bullfrog road.

SUMMARY OF PROJECTED INCREASES IN POPULATION AND EMPLOYMENT LEVELS**

County	Population	Households	School Age Population	65 Years and Over Population	Total Employment
Garfield					
1988	244	87	49	1	137
1990	13	5	3	1	5
1995	17	6	4	1	6
2000	24	7	5	1	9
Kane					
1988	4	1	1	0	1
1990	55	16	13	3	23
1995	86	25	21	4	35
2000	115	32	34	4	46

**Based on implementation of the proposal to pave the Boulder-to-Bullfrog road.

Source: Utah Office of State Planning and Budget.

The highest monthly wage earnings in 1988 would be in the construction industry with a total monthly income of $329,000. This would account for 82 percent of total increase in personal income that year. The next highest category is property income, with a projected total monthly amount of $37,000. The total annual personal income impact in the peak construction year is projected to be $4,796,000. Almost all of this increase would be generated in Garfield County, as additional employment in this county is expected to be 137, with only one additional job in Kane County.

The composition of personal income would be expected to change after construction, with the majority of increased income being generated in the trade and services sectors of the economy. Personal income in the trade sector is projected to increase to a monthly level of $35,000 in the year 2000, while the services sector would increase to almost $15,000 per month. The trade and service industries would make up almost 54 percent of additional monthly personal income by the year 2000. The other major increase in personal income would come from payments to property owners. While this source would decline from after a peak construction year high of $37,000 per month in 1988, it would increase again, to over $25,000 per month by 2000. Most of the post-construction impacts in personal income would occur in Kane County. The impact on total annual personal income in the area by the year 2000 is projected to be $1,113,000.

The impact of the project in Garfield County would be largely in the community of Escalante, with the population increasing by 220 in 1988. Escalante accounts for 90 percent of the projected population increase for the entire county. The town of Boulder is projected to have an increase of 24 in 1988. In the year 2000, the impact population in Escalante would be 21 and in Boulder, 3. Almost the entire population impact in Kane County would be in the community of Bullfrog. The population impact is projected to be 4 in 1988 and increase to 115 by the year 2000.

The Boulder-to-Bullfrog road improvement project would create 120 new construction jobs and have a population impact of 248 in the peak construction year. Most of this activity would be located in Garfield County, especially in the town of Escalante. After construction is completed, the two counties are projected to experience modest growth associated with the additional tourist traffic. By the year 2000, there is projected to be a total population impact of 139 in the two counties. The majority of this impact would be generated by the trade and service industries, which would be primarily located in Kane County in the community of Bullfrog.

It should again be noted that the total impact in Garfield County would be larger than that shown here derived from additional traffic on the new road. However, that additional impact would be a redistribution of current jobs from Wayne County. In other words, some tourists now traveling to Lake Powell spend money en route to Wayne County. If they change their route, spending patterns would change accordingly. However, there would be no net change in spending in the regional economy.

Mitigation Measures

None.

Adverse Effects Which Cannot Be Avoided Should Alternative I Be Implemented

Some loss of natural topsoils, including cryptogamic earth, would occur if this alternative is implemented. Also, some increase in sedimentation during the construction phase would occur. The amount of erosion and sedimentation at The Gulch would be greater with Alternative I-b, which proposes more extensive work there. This would also be true at the Halls Creek crossing, where Alternative I-a proposes no realignment and Alternative I-b proposes a minor realignment, the amount of erosion and sedimentation would be greater in Alternative I-b.

Loss of about 600 acres of roadside habitat would be an unavoidable short-term effect. Also, permanent loss of about 100 acres of roadside vegetation would be inevitable.

Should the road be paved, experience has demonstrated that there would be increased human activitiy at archeological sites, and some artifacts would undoubtedly be damaged or removed.

Management decisions could be structured to avoid all of the impacts that were mentioned above (e.g., administrative exclusion of some commercial activities).

The Relationship Between Short-term Uses of Man's Environment and the Maintenance and Enhancement of Long-term Productivity

The net long-term effects of paving on the natural resources along the Boulder-to-Bullfrog road are minimal. For example, long-term effects on roadside vegetation would likely relate to projected maintenance needs and roadside visitor service activities rather than to the road construction activity. Under the paving alternative, the likihood becomes greater for constructing visitor use facilities.

There are, however, unknown cumulative effects of projected increased use of the road, including potential effects of improved access for ORV users.

For cultural resources, short-term effects and long-term concerns are quite similar. Increased understanding of the cultural resources present, which could result from studies associated with this project, could lead to increased protection and increased research potential for remaining intact sites along the Boulder-to-Bullfrog road.

In terms of land use, the proposal is for a scenic road (short-term and long-term). Should the road be paved, the potential exists for future changes in agency land management direction which could allow for uses of the roadway in ways other than strictly as a scenic road for tourists.

Irreversible or Irretrievable Commitments of Resources

None are evident for natural resources. Revegetation (natural or man-induced) could be accomplished in disturbed areas, and displaced animal populations would likely become reestablished in suitable habitat.

If appropriate guidelines are followed, impacts to cultural values, particularly in direct impacts, should be minimal. However, testing and mitigation work would result in the loss of in-context archeological data and the irreversible and irretrievable alteration of the resources.

ALTERNATIVE II - GRAVEL ENTIRE ROUTE

The environmental consequences of this alternative are identical to those given for Alternative I - Pave entire route, with few exceptions. Exceptions only are considered below.

Environmental Impacts

Traffic (perhaps 50 vehicles/day) on the roadway would create dust during dry weather. As less borrow material is required, there would be less impact on quarry sites and consequently less truck hauling. Placing gravel on the road would not prevent fugitive dust from becoming an occasional aesthetic and comfort problem. Perhaps 50 percent of the short-term socioeconomic impact, and 20 percent of the long-term socioeconomic impact as identified under Alternative I would apply to this alternative.

Mitigation Measures

Same as Alternative I, except that fewer facilities and reduced amounts of vehicle emissions would likely result because of fewer vehicles using the road.

Adverse Impacts Which Cannot Be Avoided Should Alternative II Be Implemented

None other than that given for Alternative I.

The Relationship Between Short-term Uses of Man's Environment and the Maintenance and Enhancement of Long-term Productivity

The alternative to gravel the entire route infers an incremental approach to improving the Boulder-to-Bullfrog road. This could include deployment of construction equipment on the road over a period of years as funds become available; consequent cumulative impacts of noise, dust, etc. caused by the use of machinery could cause aesthetic problems and could be disruptive to traffic and to wildlife populations.

Irreversible or Irretrievable Commitments of Resources

None other than that given for Alternative I.

ALTERNATIVE III - LIMITED IMPROVEMENT

Natural Environment

Geology, Soils, and Water
Environmental Impacts

The realignment included in this alternative (between The Post and the eastern boundary of Capitol Reef National Park) is the primary impact on geological resources. Cutting and filling in the new roadway section would disrupt the soils in the area, and alter the landscape somewhat. Use of materials from borrow areas to improve the grades and to provide gravel in some road areas could lead to increased rates of sediment discharge into adjacent streams. Fugitive dust would be a dry-weather impact in certain areas.

Mitigation Measures

Methods such as reseeding, grading slopes, and installation of appropriate culverts and other surface water runoff devices would reduce soil erosion problems caused by the construction mentioned above. Sorting of materials in borrow areas could be done so that as little sediment as possible is discharged into streams.

Flora and Habitat Types:
Environmental Impacts

Removal of approximately 100 acres of vegetation along the roadway between The Post and the eastern boundary of Capitol Reef National Park would occur during construction of the new alignment.

Mitigation Measures

The abandoned roadway could be revegetated with plant species native to that area of the park.

Fauna:
Environmental Impacts

Localized disturbance and possible removal of patches of habitat could occur for some small vertebrate and invertebrate species at the realignment and at the proposed Bullfrog Creek bridge site.

Mitigation Measures

None necessary.

Endangered Species:
Environmental Impacts

None other than that given for Alternative I.

Mitigation Measures

None other than that given for Alternative I.

Air Quality:
Environmental Impacts

Construction work on the roadway west of Capitol Reef National Park and at the realignment north of The Post would create the potential for excess dust. Fugitive dust would continue at approximately the levels now experienced on the Boulder-to-Bullfrog road.

Mitigation Measures

Watering of the roadway as construction progresses would eliminate most of the dust during the construction phase.

Cultural Resources

Environmental Impacts

As this alternative essentially follows the existing alignment, except for about 6,000 feet between The Post and the eastern boundary of Capitol Reef National Park, no extensive archeological survey would be required for implementation, except for:

1. The area of the proposed realignment.

2. The bridge site at Bullfrog Creek.

3. Any borrow areas from which road construction materials may be extracted.

There would be no impacts of this alternative on known archeological sites along the Boulder-to-Bullfrog road.

Mitigation Measures

Before the construction for the realignment could begin, a thorough archeological survey would be required at the site. See Mitigation Measures for Alternative I; they would apply here.

Land Use

Environmental Impacts

Improving the Boulder-to-Bullfrog road to allow 2-wheel-drive vehicular use about 90 percent of the year could lead to an increase of about 20 vehicles/day over the 10 per day now typical. Whether this use would be sufficient to encourage changes in land use patterns along the road (e.g., additional visitor use facilities in Capitol Reef National Park) is unknown.

Mitigation Measures

None identified.

Recreation and Wilderness Values

Environmental Impacts

Improving the Boulder-to-Bullfrog road within the scope of this alternative would probably have little impact on wilderness proposals for the region. Recreational traffic could increase enough to encourage agencies and private concerns to construct support facilities such as picnic areas and restrooms near the wilderness study areas.

Mitigation Measures

None apparently required.

Socioeconomic

Environmental Impacts

Perhaps 15 percent of the short-term socioeconomic impact and none of the long-term socioeconomic impact identified under Alternative I would apply in Alternative III.

Mitigation Measures

None.

Adverse Effects Which Cannot Be Avoided Should Alternative III Be Implemented

There would be loss of topsoil and some vegetation due to the single realignment. Loss of a certain amount of habitat is an unavoidable short-term impact for burrowing organisms along the realignment and for stream fauna wherever paved dips and culverts would be installed. Fugitive dust would continue to be an occasional problem during dry weather.

The Relationship Between Short-term Uses of Man's Environment and the Maintenance and Enhancement of Long-term Productivity

All known environmental impacts relating to geology and other natural resources (soil, water, biota) are short term (lasting no more than about 5 years) in this alternative, except for fugitive dust. Short-term uses of the roadway as described in this alternative have no obvious long-term implications for recreational use, including backcountry use, or for cultural resources.

Irreversible or Irretrievable Commitments of Resources

None evident under this alternative.

ALTERNATIVE IV - NO ACTION

Environmental Impacts

Continued levels of road maintenance would have no obvious effects on soils and other geological resources of the area. Rock slides (especially on the switchbacks) and flooding (especially at Bullfrog Creek and The Gulch) would continue to occur. Incremental paving by Garfield County east of the town of Boulder would have little impact on any known resources, at least in the foreseeable future. Cumulative effects of maintenance vehicles using the road could affect some animal populations. Fugitive dust would continue to be an occasional impact.

Mitigation Measures

Present practices relating to maintenance, natural and cultural resource protection, and visitor services along the Boulder-to-Bullfrog road would be continued as funding levels and the demands of resource protection and visitor needs dictate. Archeological surveys and biological investigations (especially on T&E species) in the vicinity of the roadway would be encouraged.

Adverse Effects Which Cannot Be Avoided Should Alternative IV Be Implemented

Continued rock sliding and flooding would follow heavy storms.

The Relationship Between Short-term Uses of Man's Environment and the Maintenance and Enhancement of Long-term Productivity

Continued problems relating to the uncertainty of using the Boulder-to-Bullfrog road (e.g., rock slides, flooding, and impassible clay beds) would lead to continued efforts to improve the road, with whatever environmental consequences the improvements would achieve.

Irreversible or Irretrievable Commitments of Resources

None.

CONSULTATION AND COORDINATION

An informal scoping period was provided to identify issues and alternatives to be discussed in the Environmental Assessment. One or more individuals from the following agencies, organizations, and companies participated in the scoping and/or assembly of information for this document.

Utah Congressional Delegation

National Park Service
- Rocky Mountain Regional Office
- Denver Service Center
- Utah State Office
- Capitol Reef National Park
- Glen Canyon National Recreation Area

Bureau of Land Management
- Utah State Office
- Cedar City District
- Richfield District

U.S. Fish and Wildlife Service
- Endangered Species Office

Federal Highway Administration
- Region 8 Office, Denver

State of Utah
- Resource Development Coordinating Committee
- Utah Energy Office
- Department of Community and Economic Development
- Office of State Planning and Budget
- Utah Department of Transportation

County Commissioners
- Garfield County, Utah
- Wayne County, Utah

Organizations and Individuals
- Creamer and Noble Engineers
- Sierra Club - Utah Chapter
- Southern Utah Wilderness Alliance
- Five County Association of Governments
- Utah Wilderness Association
- National Parks and Conservation Association
- Kirkwood Oil and Gas
- The Wilderness Society - Central Rockies Region
- Southwest Resource Council
- Several private individuals

BIBLIOGRAPHY

Bureau of Land Management, 1980. BLM Intensive Wilderness Inventory: Final Decision on Wilderness Study Areas. Salt Lake City.

Bureau of Land Management (prepared by Environmental Consultants, Inc.), 1980. Soil/Vegetative Inventory in the Henry Mountain Planning Unit, Utah.

Bureau of Land Management, 1981. Escalante Management Framework Plan, Cedar City District.

Bureau of Land Management, 1982. Henry Mountain Management Framework Plan, Richfield District.

Bureau of Land Management, 1984. Circle Cliffs Combined Hydrocarbon Lease Conversion. Draft Environmental Impact Statement.

Camp, P.A., 1978. Ecological Reconnaissance, Halls Creek: Capitol Reef National Park. Utah State University.

Creamer and Noble Engineers and the Five County Association of Governments, 1984. Boulder-Bullfrog Scenic Road: Preliminary Engineering Report.

Federal Highway Administration, 1985. Paving the Boulder-to-Bullfrog Road. File report, NPS, Denver.

Five County Association of Governments, 1984. Garfield County Master Plan.

Hauck, F.R., 1979. Cultural Resource Evaluation in South Central Utah, 1977-1978. Cultural Resource Series No. 4, Utah State Office, BLM.

National Park Service, 1981. Statement for Management: Glen Canyon National Recreation Area.

National Park Service, 1982. General Management Plan: Final Environmental Impact Statement. Capitol Reef National Park.

National Park Service, 1984. Tar Sand Triangle: Conversion of Oil and Gas Leases to Combined Hydrocarbon Leases. Draft Environmental Impact Statement.

Office of State Planning and Budget, 1985. Socioeconomic Impacts of the Proposed Boulder-to-Bullfrog Road Improvement. Salt Lake City. File report, NPS, Denver.

Revitte, M., 1985. Cultural Resource Summary. File report, BLM, Richfield, Utah.

Smith, J.F., L.C. Huff, N. Hendricks, and R. Luedke, 1963. Geology of the Capitol Reef Area, Wayne and Garfield Counties, Utah. USGS Professional Paper No. 363, GPO.

Utah State Road Commission and the National Park Service, 1974. Glen Canyon National Recreation Area Road Study. File report, NPS, Denver.

Wahlquist, W.L., ed., 1981. Atlas of Utah. Brigham Young University Press, Provo, Utah.

APPENDIX
CONSTRUCTION PARAMETERS
AND TYPICAL ROADWAY SECTIONS

Extra light construction. Blade work with compaction, very minor cut and fill with haul. Primarily to restore roadway template and ditches.

Light construction. Minor earthwork; cut and fill with haul, minor adjustments in grade, with maximum cut or fills not exceeding 2 to 3 vertical feet. No major drainages involved.

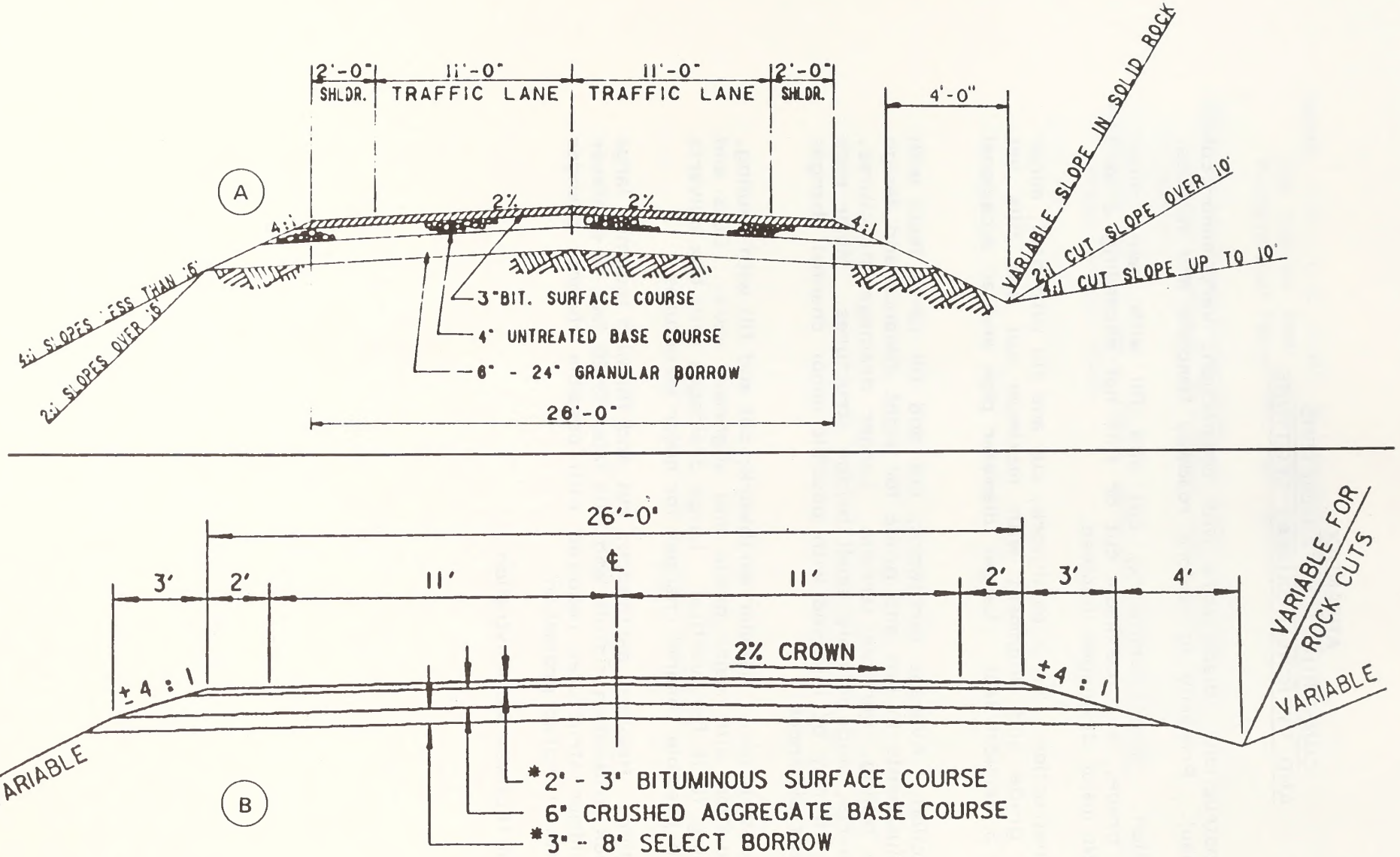
Medium/light construction. Minor earthwork; cut and fill with haul, minor adjustments in grade and alignment with maximum cut and fills not exceeding 4 to 5 vertical feet. Larger diameter pipe and an occasional box culvert.

Medium construction. Average earthwork; cut and fill (8-10 feet) with haul, larger adjustments in line and grade for sight distance and design speed in more rolling, variable terrain. Larger drainage structures, pipes, box culverts, and possibly small bridge structures. Minor rock excavation and fill may be involved with possible minor channel changes required for short distances.

Medium/heavy construction. Heavier earthwork; cut and fill with hauling, some rock excavation with major grade and alignment work. Cuts and fills not exceeding 10-16 feet vertical. Large drainages with box culverts and bridges with possible channel changes for major structures.

Heavy construction. Heaviest earthwork; cut and fill with hauling, large quantities of rock excavation. Cuts and fills from 15-20 feet to whatever is necessary. Major structures required with possible channel changes and large amounts of riprap protection.

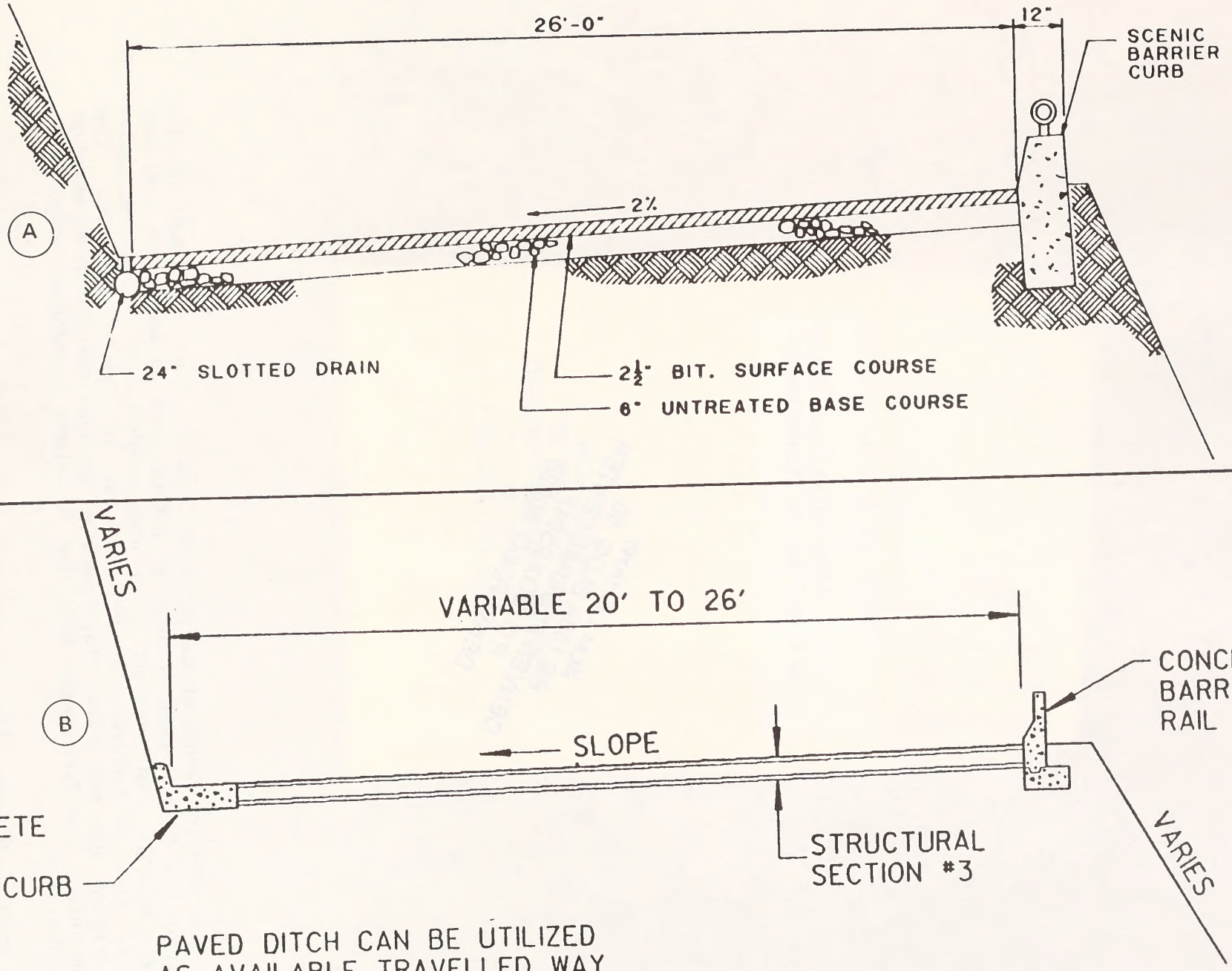
Source: Federal Highway Administration



* VARIABLE STRUCTURAL SECTION DEPTHS BASED ON SUBGRADE SOIL CONDITIONS.

Two versions of a typical roadway section through the Boulder-to-Bullfrog road.

Source: (A) Creamer and Noble
(B) Federal Highway Administration



Two versions of a typical roadway section through the Burr Trail switchbacks.

Source: (A) Creamer and Noble
(B) Federal Highway Administration

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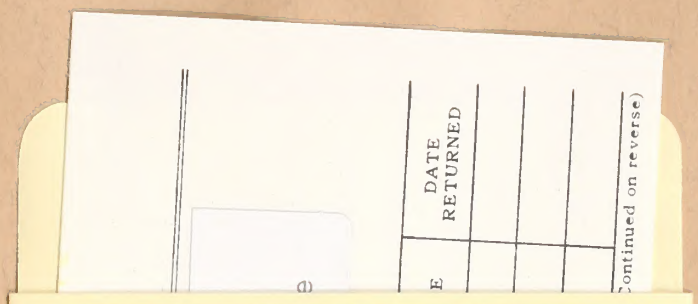

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